STEEL

The

Metalworking Weekly

MAY 30, 1960

A PENTON PUBLICATION

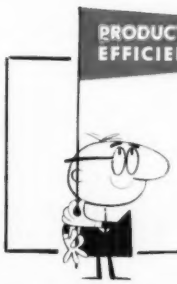
First Half Sales Head for Peak; Profit Squeeze is No. 1 Problem

Honeycomb Brazing Cut to Minutes

Plate Sales Up, but Disappointing

How to Plan for Numerical Control

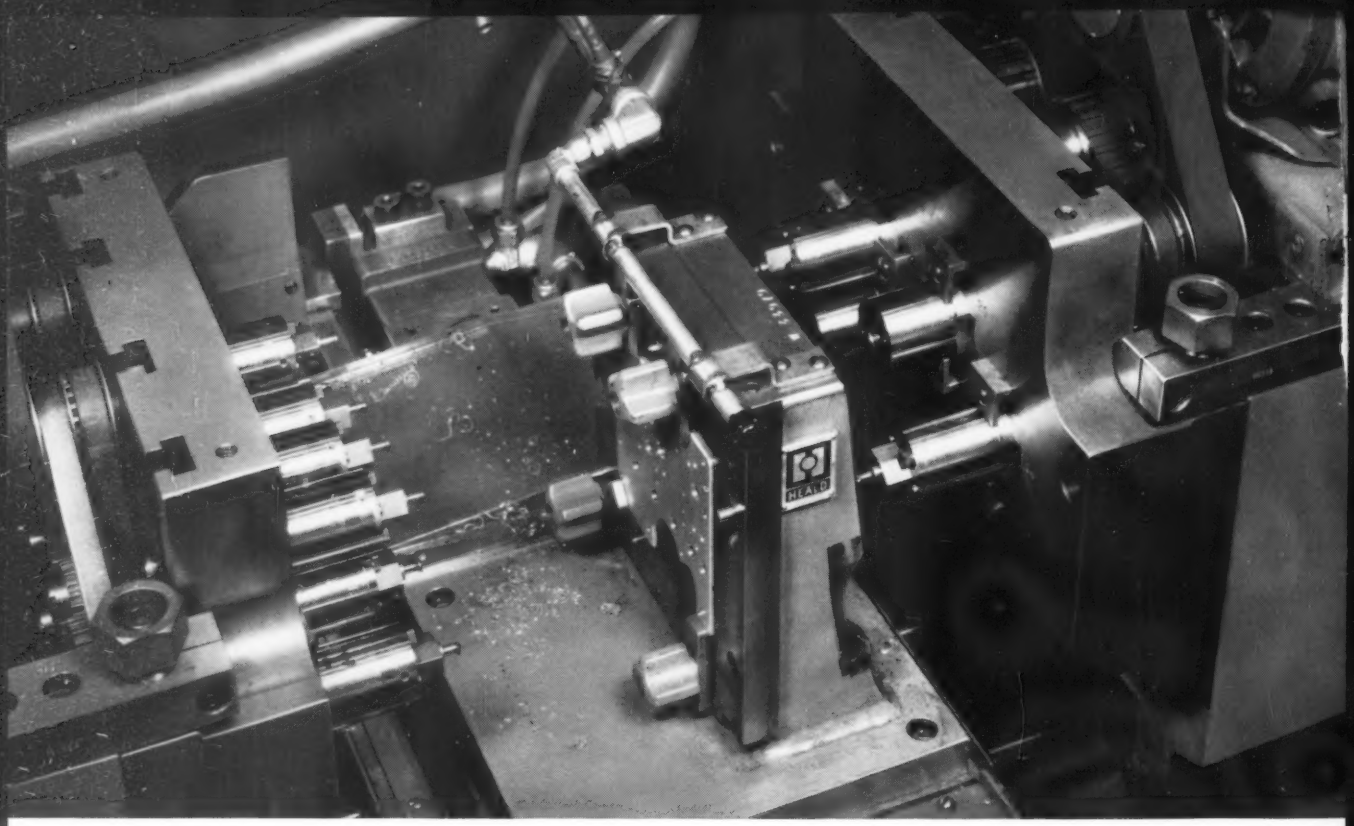
It's a production concept that can affect nearly every one of your departments. Says Adrian O. Holmberg, executive vice president-manufacturing, Miehle-Goss-Dexter Inc.: "You can't just buy numerical control and put it to work. It takes a new degree of co-operative planning and engineering. But the payoff can be terrific." For ideas on what to look for, see Page 70.



How to Pick a Vender

No. 11 in STEEL's Program for Management

CONTENTS—TURN PAGE



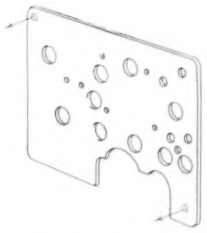
Bore 23 holes on 1 machine

Heald Model O Bore-Matic solves multiple-hole Borizing problem with interchangeable Multi-Spindle Heads

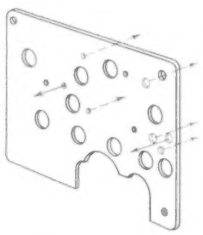
The Problem—to precision bore 23 holes, ranging from .0365″ to .3570″ in diameter, in medium-hard aluminum gear-box plates, with a tolerance of .0005″ on diameter and .0009″ on centers—also to bore 12 similar holes in a matching plate.

The Solution—a Heald double-end Model O Bore-Matic equipped with two sets of interchangeable Multi-Spindle boringheads. As shown in the drawings at the right, the 23-hole plate is precision Borized to the required tolerances in only three operations, using an indexing cross-slide and with all holes accurately positioned by cross-slide index and spindle location. One set of Multi-Spindle heads is used for the first two operations—then spindle plates are changed for the final operation. The second set of spindle plates also finishes all bores in the 12-hole plate in two operations. Average production is 10 parts per hour.

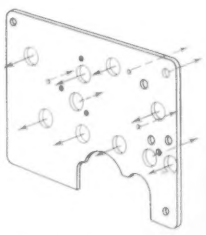
Heald Multi-Spindle boringheads consist of interchangeable spindle plates, precision bored to mount the desired number of miniature Red-Head boringheads which are belt-driven from a single motor. This arrangement permits simultaneous Borizing of multiple holes with center distances as close as ¾″. To save production time and cost on your multiple-hole borizing jobs, ask your Heald engineer for complete information on Model O Bore-Matics.



1. Bore two locating holes in single-end cycle using spindle plate No. 1.



2. Bore 7 holes in double-end cycle using spindle plates No. 1 and 2.



3. Replace spindle plates No. 1 and 2 with No. 3 and 4 and bore 14 holes in double-end cycle.

(Arrows show direction of table travel for holes indicated)

HEALD

MMT=PE

It PAYS to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.

Worcester 6, Massachusetts

Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • Milwaukee • New York • Philadelphia • Syracuse

This Week in STEEL

The Metalworking Weekly

May 30, 1960 Vol. 146 No. 22

First Half Sales Head for Peak; Profits Are Problem

No doubt about it, metalworking is heading for a record sales year. That's the attitude of hundreds of metalworking executives sounded out by STEEL's airborne editors on a nationwide opinion safari. Costs are a real problem, but product and marketing planners are rising to the challenge. PAGE 35

AISI Stresses Steel's Competition

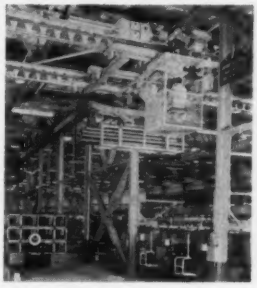
The impact of competition from other materials and low priced foreign steel was discussed at the American Iron & Steel Institute's annual meeting last week. Labor, promotion, efficiency, depreciation, and technical advancement were related to the fight. PAGE 38

Production Efficiency: How to Pick a Vender

In 1932, Ingersoll Milling Machine Co. had 260 machine tools. Today, the firm has 194, and they outproduce the 260. Such whopping improvements in production efficiency don't "come naturally," but only result from well planned equipment replacement. As Edson Gaylord, Ingersoll's general manager, puts it: "Equipment buying is one of management's most important tasks, since bad decisions in this area can cripple any company." One important decision is selecting your vender. Here are tips you can use. PAGE 45

Bearingmaker's New Plant Hikes Output

Here's how straight line material flow pays off in the new, highly mechanized Indianapolis plant of Link-Belt Co. Here, a crane operator takes a load of seamless tubing from material storage to the machining bay. On a crossover, the crane cab rides from girders in one bay to the next; the load is handled only once. With 50 per cent more capacity than the former plant, the new facility is designed for straight line flow of all products, from raw material storage to the shipping department. PAGE 68



Honeycomb Brazing Cut to Minutes

It's done with radiant heat generated by banks of quartz lamps in the Nortobraze process developed by Norair Div., Northrop Corp., Hawthorne, Calif. Heat treating can also be done during brazing cycles. PAGE 84

Plate Sales Up, but Disappointing

Shipments this half will probably near 3.5 million tons, well below the pace of the 1959 first half. Once the summer lull wears off, autumn business will determine much of this year's output. Help is needed from construction, shipbuilding, line pipe markets. PAGE 107

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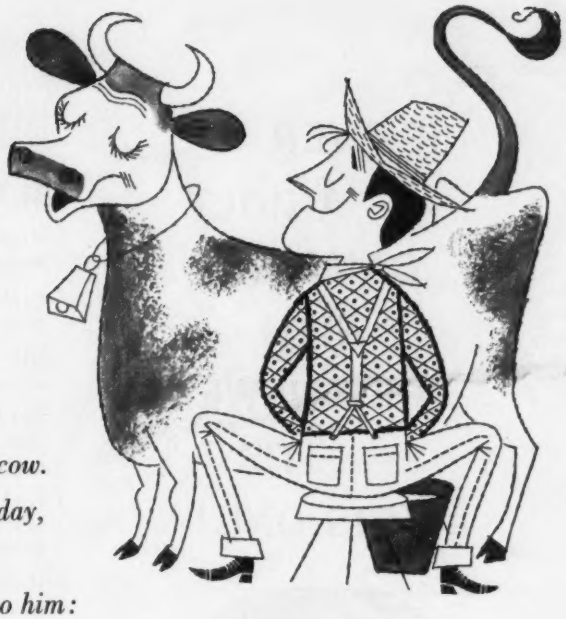
A small fable with a large moral



A Farmer owned a sleek Jersey cow.
He milked the cow every day,
and his children drank every drop.
One day a neighbor said to him:

"Charlie, my cows give more milk than I need.
I'll sell you a bucket a day very cheaply,
and you won't have to bother with milking any more."
The Farmer had a nose for bargains.
He accepted the deal. Instead of milking twice a day,
he had more time to watch TV.
Then one day his neighbor's wife had triplets.
They no longer had any milk to spare.
The Farmer tried to milk old, faithful Bossy,
but—alas—she had dried up.

MORAL: If you don't milk the cow you have, some day you may be awfully thirsty.

Whether you're a farmer or steel buyer, your safest, most reliable suppliers are right here at home. No one knows the needs of American steel buyers better than American steel makers. To serve you, and serve you well, is our primary concern—not just today and tomorrow—but year after year.

For quality steel of certified analysis, meeting the appropriate specifications, you can rely on Bethlehem Steel for such products as reinforcing bars, wire and wire products, pipe, structural shapes, plates, carbon bars . . . hot-rolled, cold-rolled, and galvanized sheets . . . transmission towers and other fabricated steel, wire rope, and industrial fasteners.

And remember, our engineers are on call to help you solve your steel-working problems.

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BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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. . . Economy
. . . Versatility

IF EVER A BOLT CAME UP WITH THE ANSWERS— IT'S THIS ONE!

The Lamson High Strength Bearing Bolt is solving some of the oldest, meanest and costliest problems ever presented by steel connections.

Recent highly successful applications include: steel mill buildings and cranes, railroad bridges, dragline buckets, construction machinery, radar antennas.

THE BASIC ADVANTAGES ARE BIG ONES:

1. High Strength Bearing Bolts combine the tensile strength of High Strength Bolts with the bearing properties of rivets.
2. High Strength Bearing Bolts have the highest shear strength and greatest resistance to slip of all structural fasteners.
3. High Strength Bearing Bolts make possible important labor savings in fabrication and erection.
4. The High Strength Bearing Bolt assembly (bolt, nut, one washer) costs no more, grip for grip, than a High Strength Bolt assembly (bolt, nut, two washers).
5. High Strength Bearing Bolts (and Lamson High Strength Bolts) are available from every Steel Service Center of U.S.S. Supply Division, United States Steel Corporation.
6. High Strength Bearing Bolts are produced by Lamson & Sessions, a "major" in the fastener industry and a prime producer of structural fasteners since the turn of the century.

FOR PRICE AND DELIVERY INFORMATION: Contact any Steel Service Center of United States Steel Supply.

FOR ENGINEERING BULLETIN AND SAMPLE: Write The Lamson & Sessions Company, 5000 Tiedeman Road, Cleveland 9, Ohio.

For easy driving, the knurls are ball-shaped in front, relieved in back, set in a spiral pattern. In most grips, bolt can be placed in hole, then pulled through connection with torques well below final assembly torque. One man can install—no need to hold the head.

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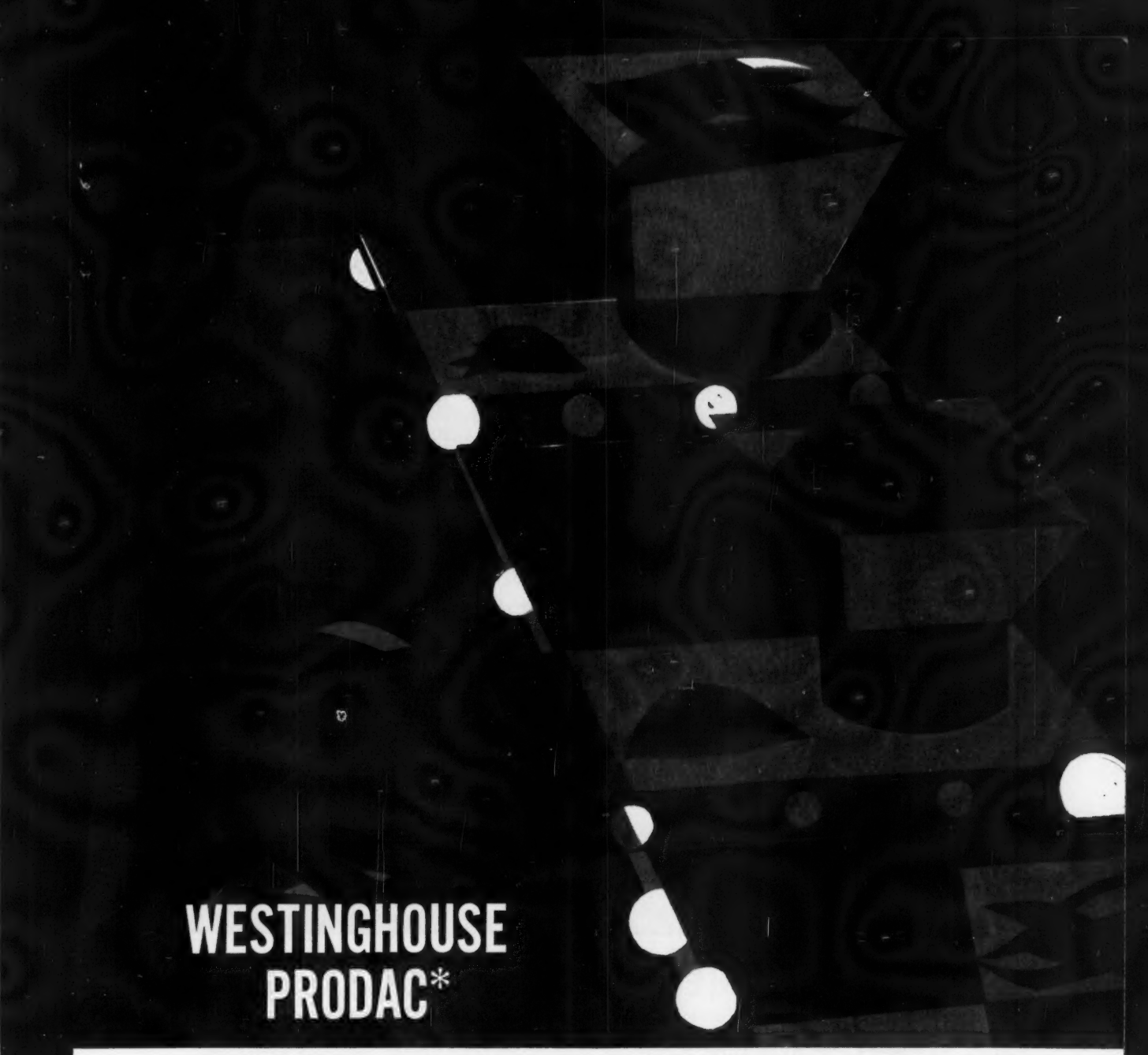
5000 TIEDEMAN ROAD • CLEVELAND 9, OHIO

Plants in Cleveland and Kent, Ohio • Chicago and Birmingham



WESTINGHOUSE PRODAC*

means automatic stocking for blast furnace charging

. . . loads and weighs stock house raw material into the skip hoist . . . delivers predetermined ingredients to furnace at the correct time and in proper sequence . . . maintains permanent record of all furnace loadings and exact time accomplished . . . then indicates when a bin needs refilling or clearing. This is but one of the many ways Westinghouse PRODAC† is helping bring about the "mill of the future" today through completely automatic stocking control for blast furnace charging.

Westinghouse has proven PRODAC installations that economically automate slabbing mills, blooming mills, reversing roughers, data accumulation systems and many other mill applications.

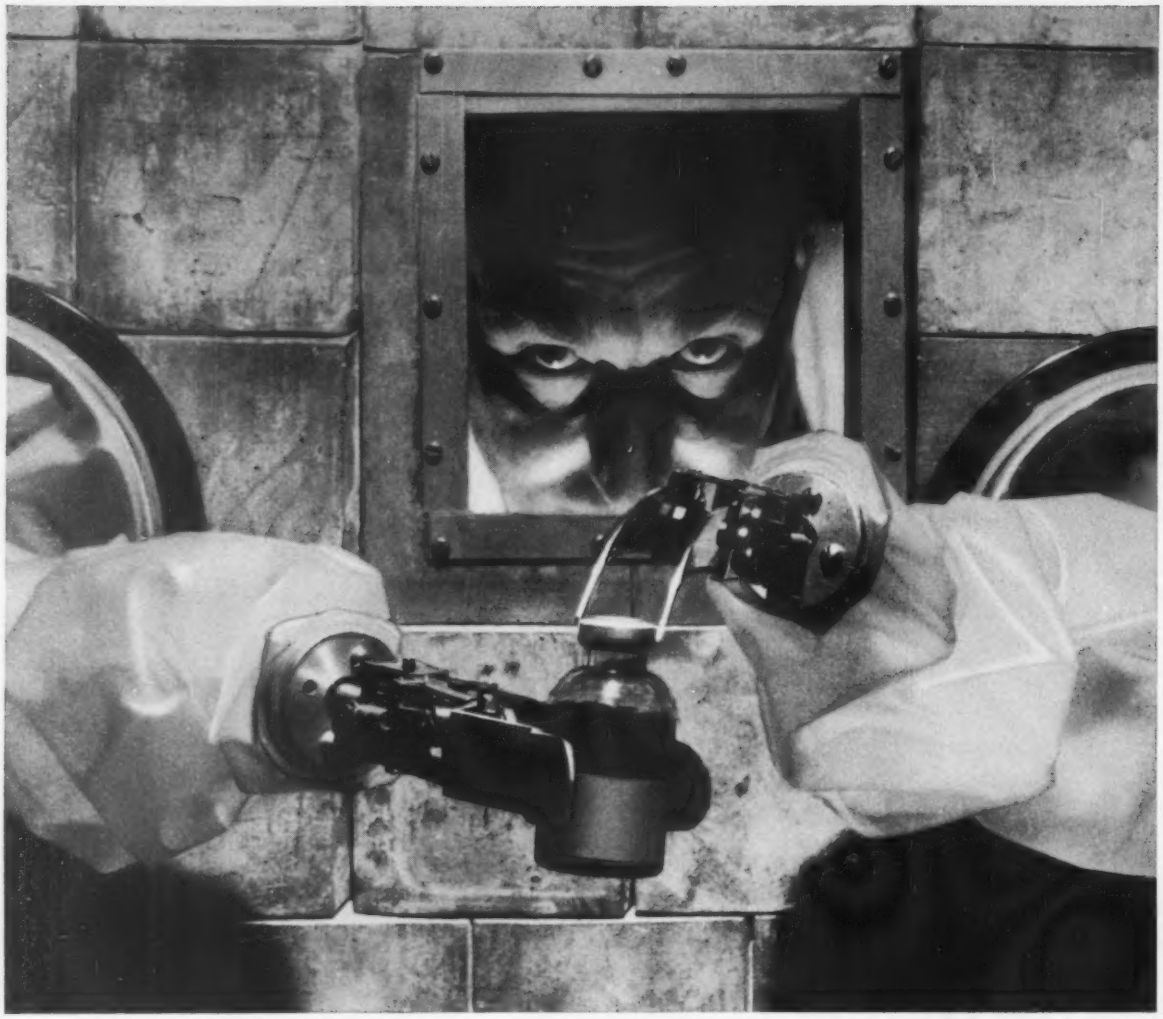
By specifying Westinghouse PRODAC for your mill, you open the door to many cost-saving benefits which are unobtainable with conventional controls. For example, PRODAC assures the most consistent standards of quality control at the highest rates of production speed . . . coordinates operation of all machines at the over-all maximum efficiency . . . holds maintenance to a minimum and practically eliminates control failures . . . gives you a "building block" design which provides flexibility required for further mill automation.

The entire team of Westinghouse PRODAC engineers is at your service to help you determine exactly where and how PRODAC can benefit you. Your Westinghouse sales engineer can give you complete information, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-22125

*PROGRAMMED DIGITAL AUTOMATIC CONTROL
†Trade-Mark

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS



PRECISE TUBING HELPS HANDLE HOT STUFF

Juggling radioactive materials takes a pair of sure hands—sure mechanical hands. Malfunctions cannot be tolerated. All components must adhere to rigid specifications and operate together perfectly. A good application for precise tubing.

We make stainless steel and nickel tubing in mechanical, aircraft, capillary and hypodermic grades in sizes up to 1 inch OD—plus an amazing variety of "specialties" such as super and "exotic" alloys, glass-to-metal sealing alloys and clad metals.

In addition, we produce a vast line of platinum products and chemicals that have been used by industry for over a century.

We are unique because of our ability to *work these metals to such tiny, precise forms.* Bulletin No. 12 describes our tubular products—Catalog No. 5 describes our platinum products. Write for them.

BISHOP

Tubular Products Division **J. BISHOP & CO.** *platinum works* 30 KING STREET, MALVERN, PENNA.

A JOHNSON MATTHEY ASSOCIATE "METALS FOR PRECISION AND PERFORMANCE"

'All About Metalworking . . .'

. . . was the claim for the Gulf States junket made by Associate Editor Bob Jaynes when he returned from STEEL's final air safari. (Views by Southern industrialists and the wrap-up of STEEL's coast to coast check on the business pulse, are elsewhere in this issue.)

The denouement came when Bob opened his briefcase to show photos taken on the trip. Out tumbled shots of a Boeing 707 jetliner, the swimming pool at the Shamrock Hilton in Houston,

and this candid of Byron Nelson (left—a noted ironman) Bob (center) and Jack C. Pace, president, General Steel Co., Ft. Worth, Tex.

It seems Bob had *somehow* arrived in Ft. Worth *just* when the Colonial Country Club's 15th Annual National Invitation Golf Tournament was in progress. "Naturally, everybody was out at the tourney," says he. Intrepid reporter that he is, Bob* trekked to the course, hosted by Mr. Pace. It was there that he met Mr. Nelson.

In reality, Bob did interview a number of other metalworking executives, and we asked him if he had queried Dr. Cary Middlecoff about what's new in dental tools. "No," was the beaming reply, "but Ben Hogan had some tips on irons."

**Bob is also a golfer. He shoots in the 70s—and then goes home, no matter what hole he's on.*

Laconic Lexicon

Inertial guidance isn't a system of missile guidance after all. Raytheon Co. engineers avow it's "permissive parenthood, or leaving well enough alone."

Between technical sessions at a New York meeting of the Institute of Radio Engineers, the Raytheon Imagineers lexiconized thusly:

Megacycle—Small Italian motor scooter.
Grid bias—College football game reported by old grad.
Isolation network—The office grapevine.
Memory tube—A wedding ring.
Telemetering—Why women need unlimited phone service.
Thermister—A hot engineer.
Damped oscillation—End of a rock 'n roll party.
Semiconductor—Railroad official under 5 ft 2 in.

"Thanks for the Opportunity . . .

. . . to participate," writes Dick DeCorps, purchasing agent for Automatic Steel Products Inc., Canton, Ohio. Dick sent the note with his Beat-the-Experts entry and commented: "I'm just exploring the possibility that I might be close."

If you'd like to join Dick and hundreds of other readers in our contest, just complete the entry coupon in this department and send it in.

The top prize: Two weeks free use of any Ford Div. car. Five runners up will receive full color prints of a dream car designed for STEEL by Virgil M. Exner, Chrysler Corp. vice president and director of styling.

Letters to the Editor . . .

. . . have been piling high on Editor Walt Campbell's desk. Frankly, we're behind on our counting, but the letters amount to requests for tens of thousands of reprints of Walt's testimony before the House Appropriations Subcommittee on Foreign Operations. (STEEL, May 2.) His topic: The impact of foreign competition.

"WOULD LIKE 200 COPIES FOR STAFF CLUB MEMBERS ALL SUPERVISORY PERSONNEL," R. J. Kraut, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. . . . "an excellent presentation," Louis Polk, president, Sheffield Corp., Dayton, Ohio . . . "Timely, to the point, and effective," George Gorton III, president, George Gorton Machine Co., Racine, Wis. . . . "One of the best presentations I have ever read,"

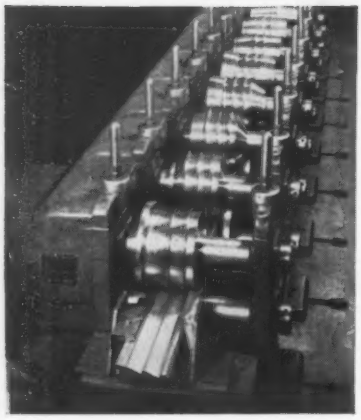
I believe _____ automobiles will be produced in the U. S. from Jan. 1 through Dec. 31, 1960.

Mail this to:

Ed Service
Beat-the-Experts
STEEL
1213 W. 3rd St.
Cleveland 13,
Ohio

PRINT NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____

Entries must be postmarked before midnight, June 30.



Yoder Roll-Forming Equipment mass-produces shapes accurately, economically

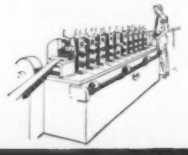
Yoder Roll-Forming Equipment, even with part-time operation, can effect significant savings in many metal working applications and industries. Shapes, simple or complex, can be quickly and economically produced the Yoder way from a wide variety of flat-rolled coated or uncoated stock ... in thickness up to ¾ inch ... in speeds up to 50,000 feet per day.

Yoder engineers flexibility and precision into metal forming operations. For example: many basic shape modifications, such as coiling, welding, notching, ring-forming, perforating, and cutting to length can be simultaneously accomplished with little or no additional labor cost.

Yoder also makes a complete line of Rotary Slitters and Pipe and Tube Mills. Profit from Yoder's years of engineering and service experience, contact your local Yoder representative or send for the Yoder Roll-Forming Manual.

This fully-illustrated 88-page book clearly discusses every important aspect of Yoder Roll-Forming Equipment and methods ... it's yours for the asking!

THE YODER COMPANY
5502 Walworth Avenue • Cleveland 1, Ohio



ENGINEERING YODER MANUFACTURING
COLD ROLL FORMING MACHINES

M. A. Hollengreen, president and general manager, Landis Tool Co., Waynesboro, Pa.

Management Specter

Selling the boss on buying a machine is one thing —selling labor on using it is another. Next week, in the Program for Management series, Associate Managing Editor John Morgan will show how managers must do a better job of selling Production Efficiency to organized labor and to workers. John has found nearly as many bogeyman fears surrounding technological change as there are hovering around the atomic menace.

Because your machine is only as good as the man who runs it, you need to give greater attention to allaying worker alarm over job security. That's especially true because those fears are being fanned by the politically savvy labor leaders.

Turning the Tide

"Please send me two copies of the May 9 article, 'How Singer Sells the World Market,'" requests G. F. Crosby, manufacturing manager, Robins Conveyors Div., Hewitt-Robins Inc., Passaic, N. J.

"You have selected a good example and the subheadings apply to most every manufacturing concern. Our plant is more in job shop production than high volume, but the principles under 'Production Efficiency, Standardization, Advanced Design, and Reliability,' are as characteristic of our potential solutions as they are of Singer's."

Andrew J. Wayson, vice president, Merriman Bros. Inc., Boston, also asked for two copies and said: "Singer puts a good many of us to shame. More along this line could help turn the tide."

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—May, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you will win $500.

There's more . . . You will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You can enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Deadline for this month's contest is July 1, 1960.

... Fluid Power news

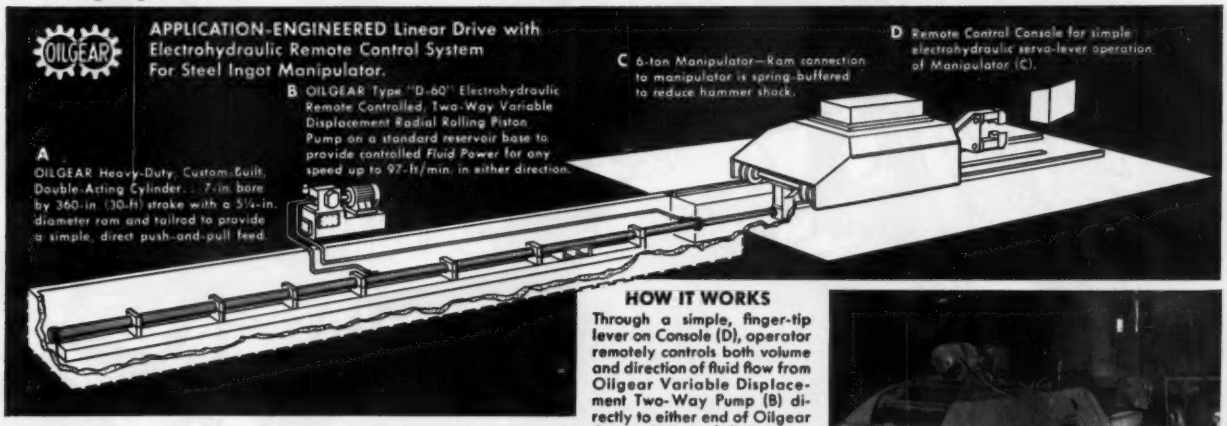
REPORT NO. 11,801 REMOTE CONTROLLED INGOT MANIPULATOR

From Oilgear *Application-Engineering* Files

HOW OILGEAR DRIVE SYSTEM ON INGOT MANIPULATOR IMPROVES CONTROL—CUTS DOWNTIME

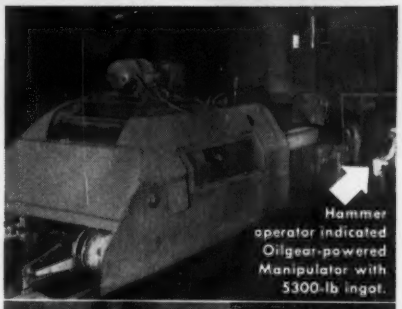
DATA: Replace an electric variable speed drive on a 6-ton ingot manipulator because of excessive maintenance downtime, high rebuilding and replacement costs. Initial replacement plans called for a hydraulic variable speed drive directly to manipulator wheels, retaining customary practice of operators riding on manipulator. A job study revealed that while feeding an ingot under the open frame steam hammer, forward motion is momentarily stopped by each hammer impact—frequently bouncing manipulator wheels in the air, causing traction, speed control, shock, and operator fatigue problems.

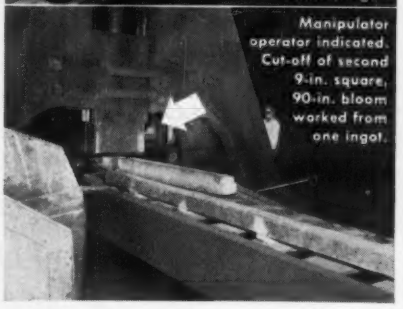
Basic Manipulator Drive Requirements were re-evaluated as follows: 1. Remove drive from manipulator to reduce shock-provoked maintenance downtime. **2.** Drive to be independent of wheel traction to improve feed and control. **3.** Provide stepless, remote speed control from zero to maximum in both directions. **4.** Withstand severe shock, vibration, heat, and dust on a continuous 16-hour day basis. **5.** Reduce operating, maintenance, and installation costs. **6.** Provide for future incorporation of hammer control with remote manipulator console.


APPLICATION-ENGINEERED Linear Drive with Electrohydraulic Remote Control System For Steel Ingot Manipulator.
A OILGEAR Heavy-Duty, Custom-Built, Double-Acting Cylinder . . . 7-in. bore by 360-in. (30-ft) stroke with a 5¼-in. diameter ram and tailrod to provide a simple, direct push-and-pull feed.
B OILGEAR Type "D-60" Electrohydraulic Remote Controlled, Two-Way Variable Displacement Radial Rolling Piston Pump on a standard reservoir base to provide controlled Fluid Power for any speed up to 97-ft/min. in either direction.
C 6-ton Manipulator—Ram connection to manipulator is spring-buffered to reduce hammer shock.
D Remote Control Console for simple electrohydraulic servo-lever operation of Manipulator (C).

HOW IT WORKS

Through a simple, finger-tip lever on Console (D), operator remotely controls both volume and direction of fluid flow from Oilgear Variable Displacement Two-Way Pump (B) directly to either end of Oilgear Custom Cylinder (A). Only two pipe lines are required. Power input is used only in proportion to work performed, as no pump output power is wasted in direction control valves, external relief valves, flow control valves, auxiliary components, or excessive piping. Stepless, infinitely variable, smooth, steady manipulator speeds are instantly available in either direction. Fluid flow and pressure decelerate to zero as flow direction is changed—flow and pressure then accelerate to any selected amount in the new direction . . . reversal is smooth-cushioned — shock is eliminated. Controlled acceleration and deceleration; hydrodynamic braking; automatic pressure and flood lubrication; continuous filtration of power fluid . . . all are inherent features of Oilgear "Any-Speed" Drive Systems.


Hammer operator indicated. Oilgear-powered Manipulator with 5300-lb ingot.


Manipulator operator indicated. Cut-off of second 9-in. square, 90-in. bloom worked from one ingot.

SOLUTION: An Oilgear Linear Drive and Electrohydraulic Control System as shown above schematically. This departure from customary manipulator drives has proved—*in over two years of operation*—to have the following advantages: **1.** Lower operating costs . . . previous manipulator averaged 12% to 15% downtime every 16-hour day for repair and adjustment of drive and control components. **2.** Direct push and pull linear drive is a more positive, smoother, shockless feed—NOT affected by variations in wheel traction. **3.** Remote console with simple electrohydraulic servo control eliminates operator discomfort and fatigue. **4.** Cylinder is protected below floor—"Power-Pak" is mounted away from heat and dust of work area. **5.** Constant, automatic overload protection insures longer life, prevents damage.

System was selected due to Oilgear's reputation for trouble-free reliability, long life, simplicity, and on-the-job-proved performance of the following *Oilgear-Powered* equipment in this user's plants . . . 300-ton ingot strippers . . . large forming presses . . . tube pointing presses . . . hydrostatic testers . . . stripping presses . . . pipe benders . . . seamless steel tube piercers . . . planers . . . cut-off machines . . . tube threaders—operating efficiently—in constant, daily use—some have been in service for more than 20 years.

User Reports—" . . . well pleased with the steady feed rate at both low and high speeds . . . we'll go to this type of drive when we rebuild or require another Manipulator."

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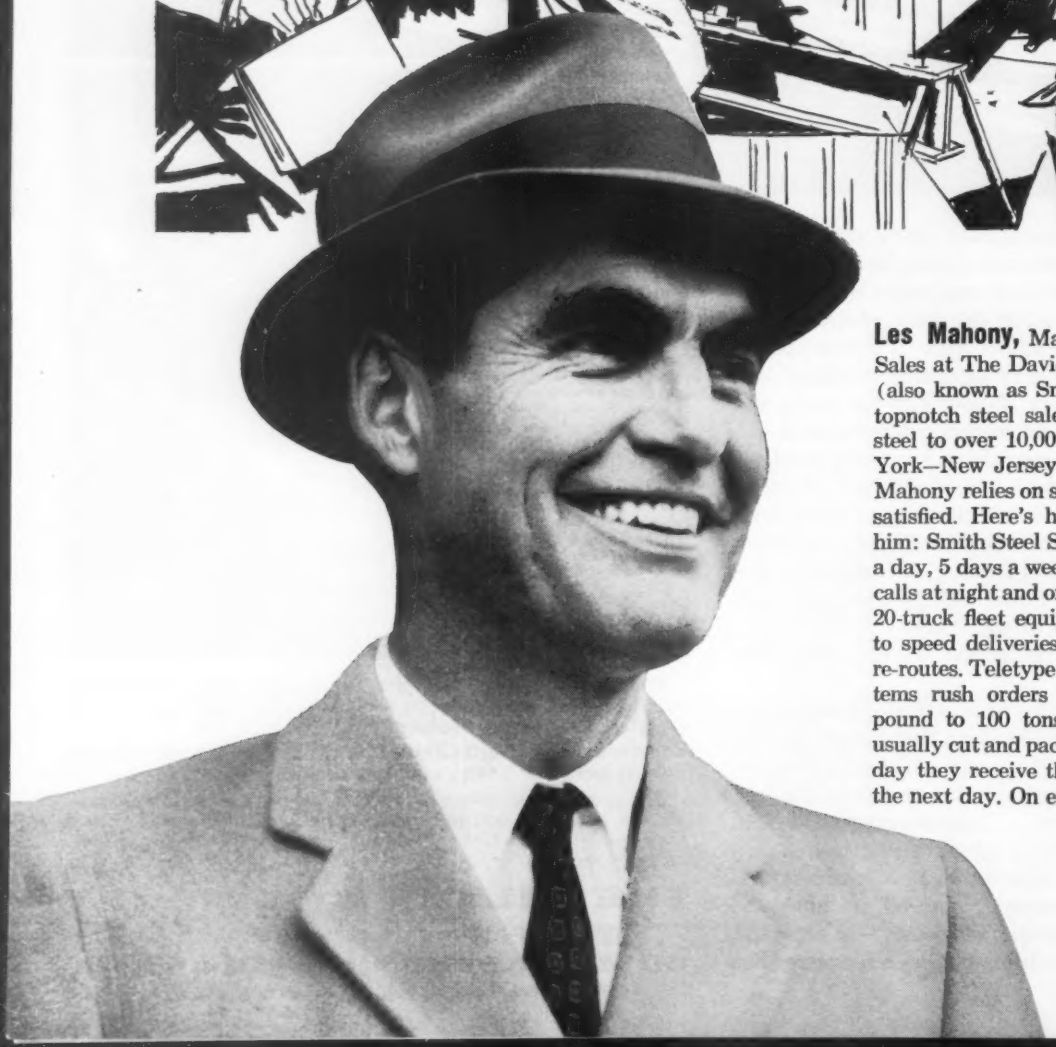
Whirlwind service by



Les Mahony, Manager of Stainless Steel Sales at The David Smith Steel Company (also known as Smith Steel Service), is a topnotch steel salesman. He helps supply steel to over 10,000 customers in the New York—New Jersey metropolitan area. Mr. Mahony relies on service to keep customers satisfied. Here's how the company backs him: Smith Steel Service operates 24 hours a day, 5 days a week. They take emergency calls at night and on weekends. They have a 20-truck fleet equipped with 2-way radios to speed deliveries and handle emergency re-routes. Teletype and data processing systems rush orders which range from one pound to 100 tons. Smith warehousemen usually cut and package the orders the same day they receive them. Then, they deliver the next day. On emergency requests, they

Smith starts a cyclone

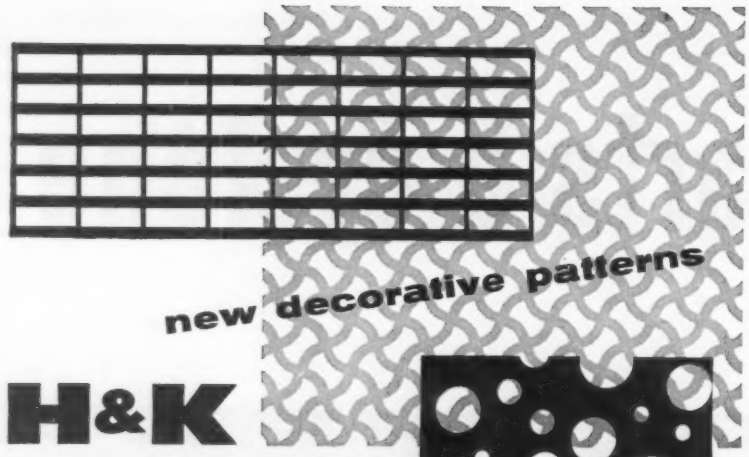
can cut, package and deliver the steel in one day. Smith Steel Service carries over 10,000 items, including Stainless Steel plates, sheets and bars in all sizes and shapes. They keep special stocks, data cards, blueprints and patterns for their regular customers. Smith's customers get steel faster. They save on storage costs. They cut machinery costs and labor, because the steel is cut to size before delivery.

The Ducon Company of Mineola, N.Y., is one of Smith's best customers. Ducon buys Type 304 Stainless Steel plate to fabricate catalyst recovery units, known in the petroleum industry as cyclones. These funnel-shaped units centrifugally hold the catalyst from escaping during the Catalytic Cracking process. The extreme heat used here would damage other metals, but Stainless Steel's excellent heat resistance and strength prevent the cyclone walls from collapsing or deforming. Ducon uses Stainless because it also resists oxidation and gas and sulphur corrosion that occur in petroleum refining. Stainless Steel greatly reduces refinery shutdowns and equipment repairs or replacements. Ducon finds Stainless Steel isn't difficult to fabricate. They quickly roll it, shape it and weld it into a finished unit.

It pays to use the right material from the start. If you need strength at high temperatures and corrosion resistance, there is no material that can match the performance of USS Stainless Steel. *USS is a registered trademark*

USS **United States Steel**

This mark tells you that a product is made of modern Steel



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perforated materials

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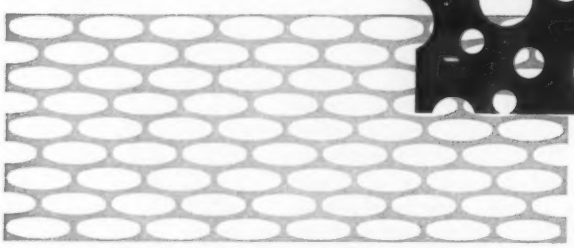

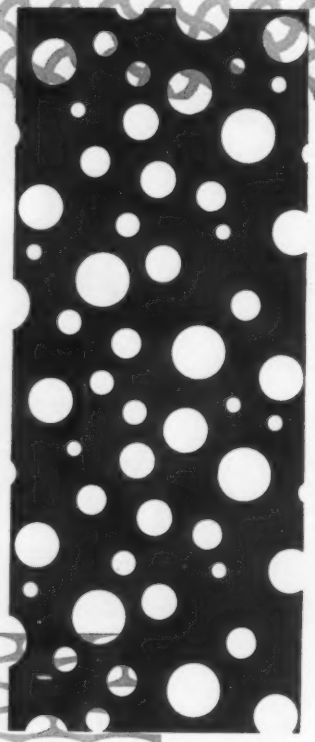

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CALENDAR
OF MEETINGS

May 30-31, Wire Reinforcement Institute Inc.: Spring meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 1049 National Press Bldg., Washington 4, D. C. Managing director: Frank B. Brown.

May 30-June 4, Concrete Reinforcing Steel Institute: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Institute's address: 38 S. Dearborn St., Chicago 3, Ill. Managing director: H. C. Delbell.

June 1-4, Automotive Engine Rebuilders Association: Annual meeting, Netherland-Hilton Hotel, Cincinnati. Association's address: 901 Roosevelt Bldg., Indianapolis 4, Ind. Executive vice president: James H. Templin.

June 5-9, American Society of Mechanical Engineers: Semiannual meeting and aviation conference, Statler-Hilton Hotel, Dallas. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

June 5-9, Association of Industrial Advertisers: Annual meeting and exhibit, Shoreham Hotel, Washington. Association's address: 271 Madison Ave, New York 16, N. Y. President: John C. Freeman.

June 5-10, Society of Automotive Engineers Inc.: Summer meeting, Edgewater Beach Hotel, Chicago. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

June 6-8, American Gear Manufacturers Association: Annual meeting, Homestead Hotel, Hot Springs, Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive director: John C. Sears.

June 6-8, Malleable Founders' Society: Annual meeting, Elbow Beach Surf Club, Hamilton, Bermuda. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

June 6-9, National District Heating Association: Annual meeting, Grove Park Inn, Asheville, N. C. Association's address: 827 N. Euclid Ave., Pittsburgh 6, Pa. Secretary-treasurer: John F. Collins Jr.

June 13-15, Metal Powder Industries Federation and Metallurgical Society of AIME: International conference on powder metallurgy, Biltmore Hotel, New York. Federation's address: 60 E. 42nd St., New York 17, N. Y. Executive secretary & treasurer: Kempton H. Roll.

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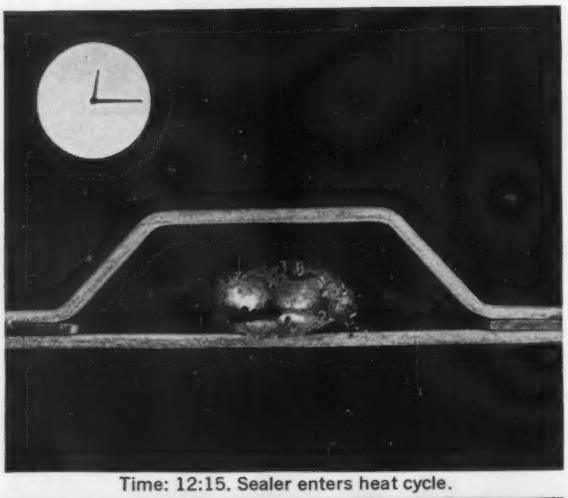
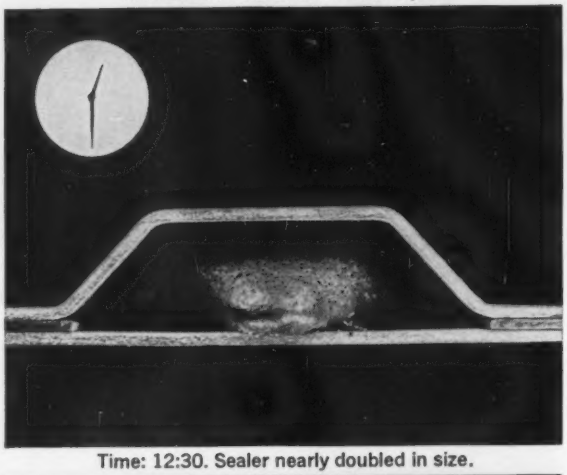
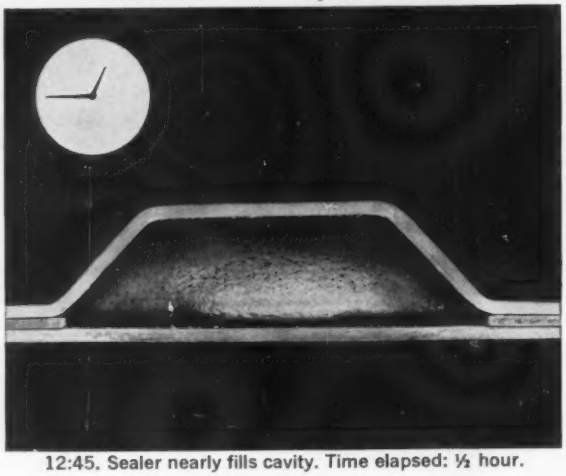


Time: 12:15. Sealer enters heat cycle.



Time: 12:30. Sealer nearly doubled in size.



12:45. Sealer nearly fills cavity. Time elapsed: ½ hour.

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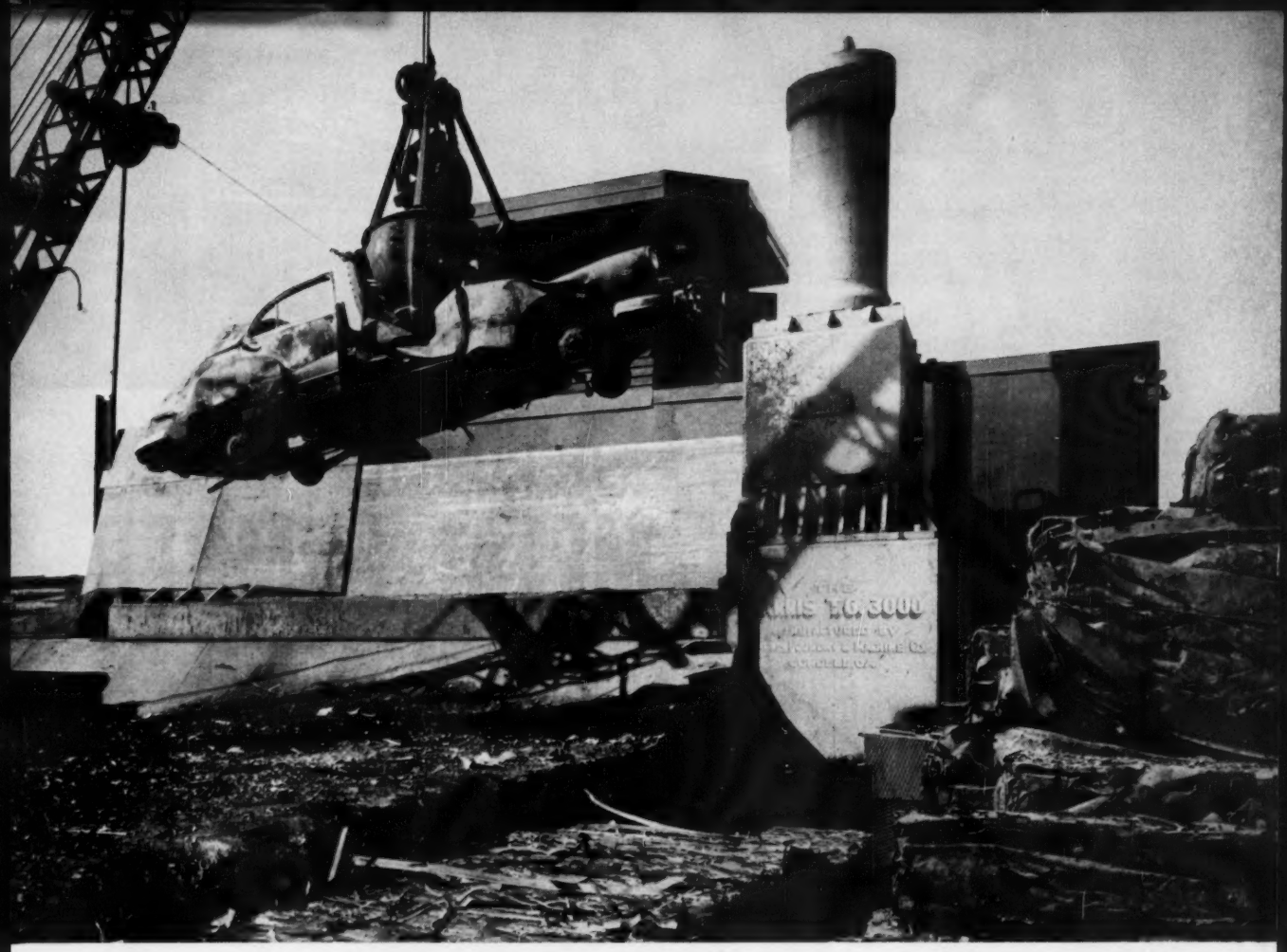
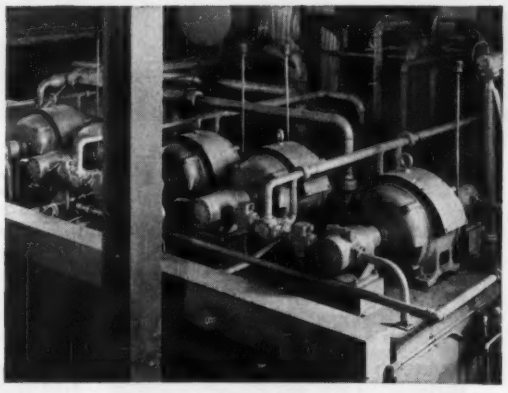


Smashing ¾ ton autos into 5 ft. bales

In a scrap salvage yard in Chicago, this huge press smashes automobiles into five-foot bales. Here's how it works. Stripped autos are shoved into a 20-foot press box. At the flip of a switch three giant plungers jam down with a force of over 1000 tons. Result: A compact bale, five feet long and two feet deep. About 30 cars an hour are run through this giant baling press.

Powering this mammoth machine requires sturdy motors. They have to deliver an instantaneous surge of power to drive home the huge plungers. Five Century Electric 100 hp motors do the job. Result: Plenty of dependable power when and where it's needed.

Century Electric application engineers have helped develop thousands of motor drive systems like this. And they can design the right drive system for your equipment because Century Electric designs, manufactures and applies motors and nothing but motors . . . your assurance of getting *more* than just a motor.



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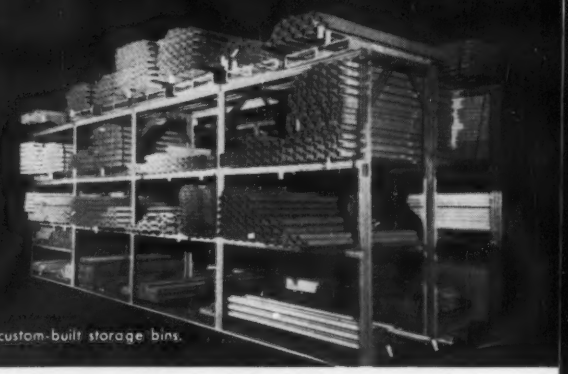

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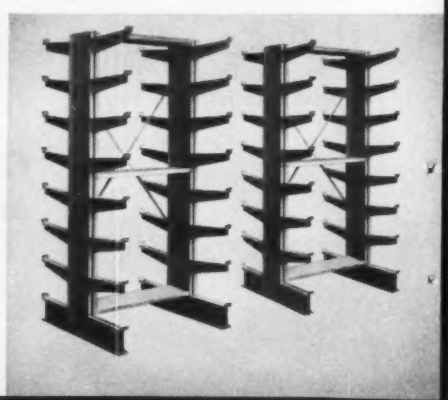

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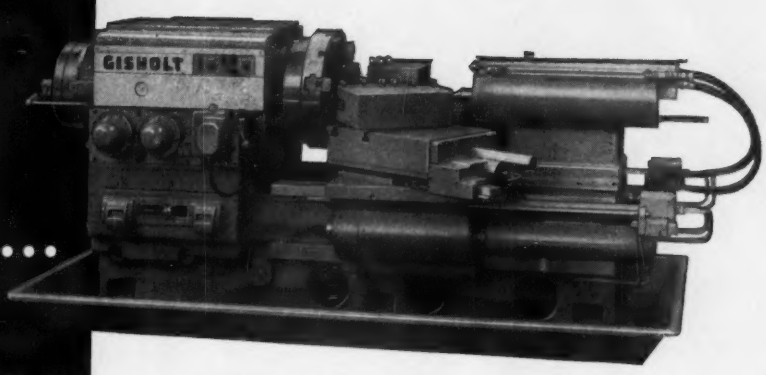
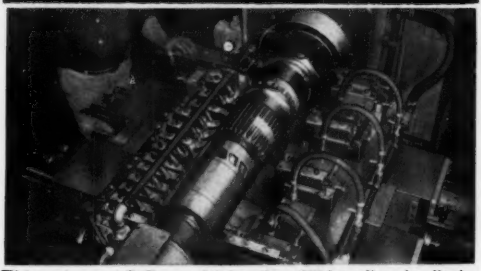


that's why the

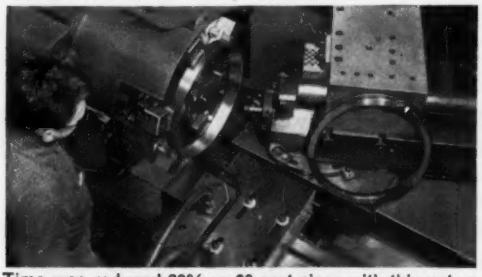
GISHOLT No. 24

Automatic Chucker

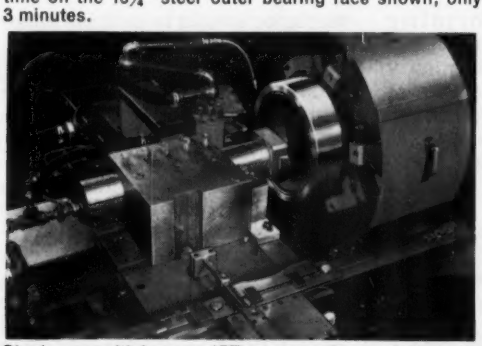
cuts costs four ways



This setup cut O.D. machining time 27% on diesel cylinder liners. Basic design of No. 24 offers flexibility and power to handle multiple surfaces on large parts. Nineteen tools machine 16 surfaces in only 6 minutes f.t.f.



Time was reduced 30% on 60 part sizes with this setup. Front and rear independent slides are placed to suit the work. Optional swivel bases speed angular settings. F.t.f. time on the 15¾″ steel outer bearing race shown, only 3 minutes.



Single- or multiple-pass JETracers on the rear independent slide increase versatility. Here a single-pass JETracer handles six types and 24 sizes of steel bearing races. Two 8-minute operations complete part shown, removing 90-lb. metal, holding .0005″ tolerance in spherical bore.

When you bring the speed and the versatility of the Gisholt MASTERLINE No. 24 into your shop, here's what happens:

1. You profit from high-speed, automatic production on a wide range of work, from small lots to long runs.
2. You get the production of an expert from an inexperienced operator. Automatic cycle gives you repeat accuracy and optimum tool life at fixed production rates.
3. You reduce labor requirements—one operator handles two or more machines.
4. You get the speed, the power, the rigidity to take full advantage of today's most advanced cutting tools for maximum metal removal and finer finishes.

The jobs at the left are just a small sample of what you can do on the fast, versatile Gisholt MASTERLINE No. 24 Automatic Chucking Lathe. What can it do...how much can it save on your work? Find out. Call your Gisholt Representative or write for Bulletin 1213.

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Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes
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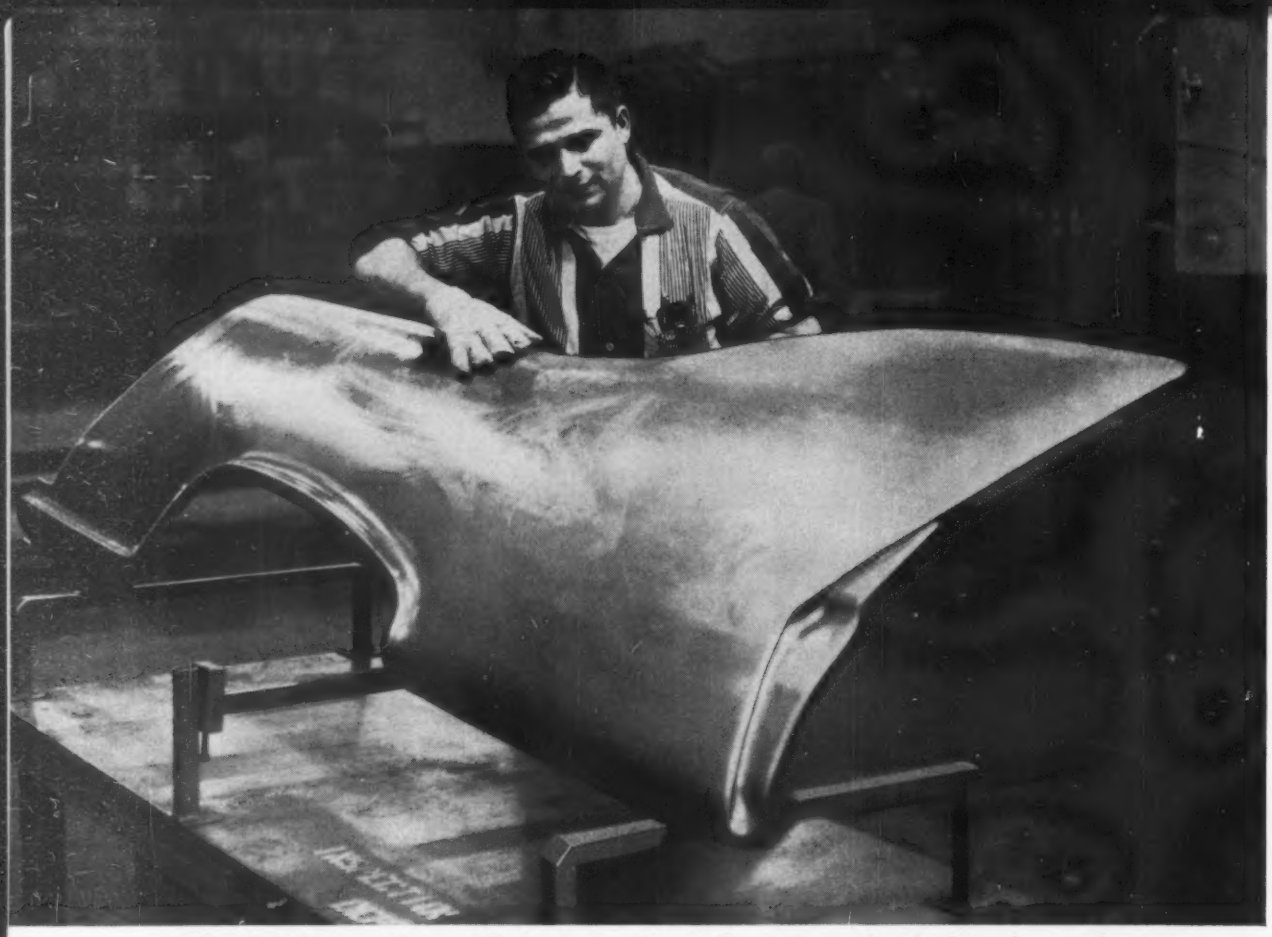


One of the largest and most difficult of some 600 stamped parts produced at Chrysler Corp's. Twinsburg (Ohio) Stamping Plant, rear quarter-panel of Plymouth two-door hard-top shows performance results of Pittsburgh Steel's drawing quality sheet under tough forming conditions.

Pittsburgh Steel Sheet Helps Chrysler Corp. Build 'Solid '60' Plymouths

There's more than meets the eye in the distinctive fin styling on the "Solid '60" Plymouth.

First, they're no longer simply fins—they've been given a performance job in Chrysler Corporation's new "unit construction" assembly to help reduce driver steering effort in normal highway travel.

Second, there is another performance story behind the aero-dynamic sweep of Plymouth's rear quarter-panel of which the stabilizer, or fin, is a part. It's the performance of Pittsburgh Steel Company's cold rolled sheet under stress of severe deformation in a complex die-forming operation.

Pittsburgh's drawing quality steel used for this part must, at one time, produce a deep curved draw for the panel's saddle, a shallow draw for the wheel housing and a severe dog-leg draw for the tail light area.

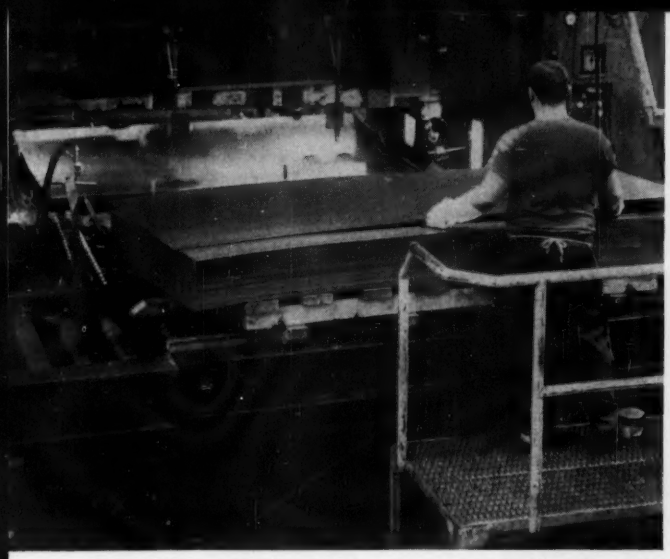
Simultaneously, it must have sufficient ductility to prevent buckling in the drawn areas and uniform flatness to achieve a stiff panel which resists a "pop-pop" oil can effect under pressure. Otherwise, an additional operation would be required.

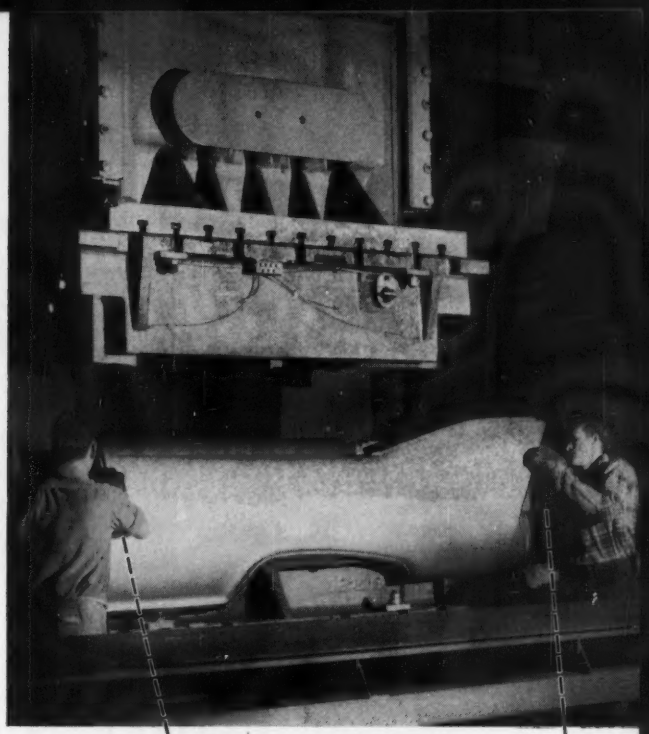
Finally, the formed panel must emerge without flex marks, strain marks or breaks to provide a mar-free surface ready for finishing.

Pittsburgh Steel each day proves its drawing quality sheet can perform within these rigid requirements at Chrysler's big Twinsburg (Ohio) Stamping Plant where some 600 stamped parts are produced for all Chrysler "big car" models.

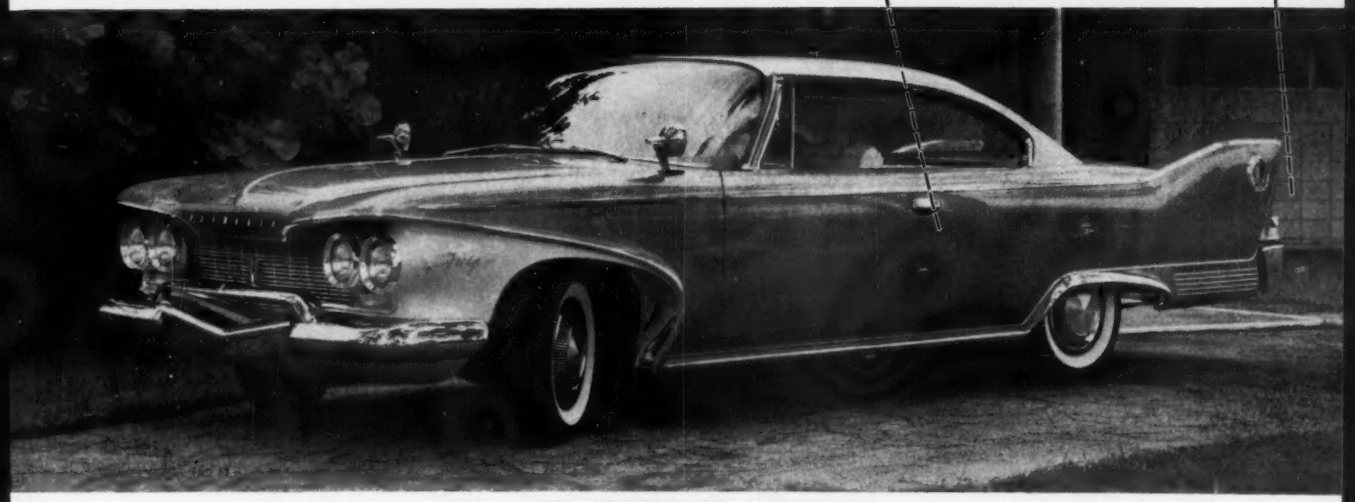
Besides being one of the most difficult parts to form, the rear quarter-panel (rear fender) of Plymouth's two-door hardtop is one of the largest stamped parts produced at Twinsburg.

To meet the performance standards established by Chrysler, the steel is precisely





Steel blank measuring 110 by 47 by .041 inches is fed into big toggle press above for die-forming operation that will produce basic shape of rear quarter-panel. The ductility and the flatness of Pittsburgh Steel's cold-rolled sheet are critical here due to severe deformation. Drawing quality sheet, with properties metallurgically matched to forming requirements, produces this sleek panel (right) that provides distinguished rear quarter styling and stabilizing feature for Plymouth's 1960 two-door, hard-top model (below).



The "Solid '60" Plymouth Fury.

controlled from open hearth to temper mill by Pittsburgh Steel's veteran steelmakers. They achieve the chemical composition, ductility, hardness, grain size, flatness and finish required in steel to form the part.

And that's where Pittsburgh Steel's field metallurgists also serve Chrysler — by studying every die-forming operation to determine exact properties required to achieve peak performance in the stamping process, in assembly and ultimately on the road.

The result: steel with metallurgically controlled drawing qualities matched to the part's forming problem.

The performance benefits of Pittsburgh Steel's drawing quality sheet will work for you, too. Metallurgical practices and services developed by nearly 60 years of steelmaking experience enable Pittsburgh Steel to produce flat rolled with the precise properties your operation requires.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

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Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

New! The most reliable limit switch ever developed

(from Cutler-Hammer, of course)

Limit switch failures cause more production down time than any other electrical component. Suddenly this problem has been greatly reduced by the new Cutler-Hammer oiltight limit switch. Under test conditions much tougher than in actual production, it lasted far longer than any other limit switch.

It fits almost anywhere and in any position. A simple field adjustment changes switch operation to close the contacts by lever motion that is clockwise, counterclockwise, or both. And, no other switch is sealed more effectively. Even the silver-to-silver contacts are visible for quick inspection. Send for Pub. ED143-J213 now for full details.

What's new at Cutler-Hammer? We're planning ahead—with new, *better* products, like the limit switch. We've added plant capacity, new engineering talent and our new trademark symbolizes our new capabilities to help you plan ahead. Call the nearest Cutler-Hammer sales office or distributor to see how we can fit into your team.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

LIMIT SWITCH
NO.
WITH SELECTED OPERATOR
AMPERE RATINGS
VOLTS
AC
DC
AC INRUSH
115
15
0.5
40
230
10
0.2
20
460
6
—
10
600
5
.02
8

MOS

NEW SYSTEMS TECHNIQUE PROVIDES CURRENT DATA TO CONTROL YOUR MANUFACTURING CYCLE... MAKES YOUR OPERATION MORE EFFICIENT, WITH FASTER RESPONSE TO CHANGES

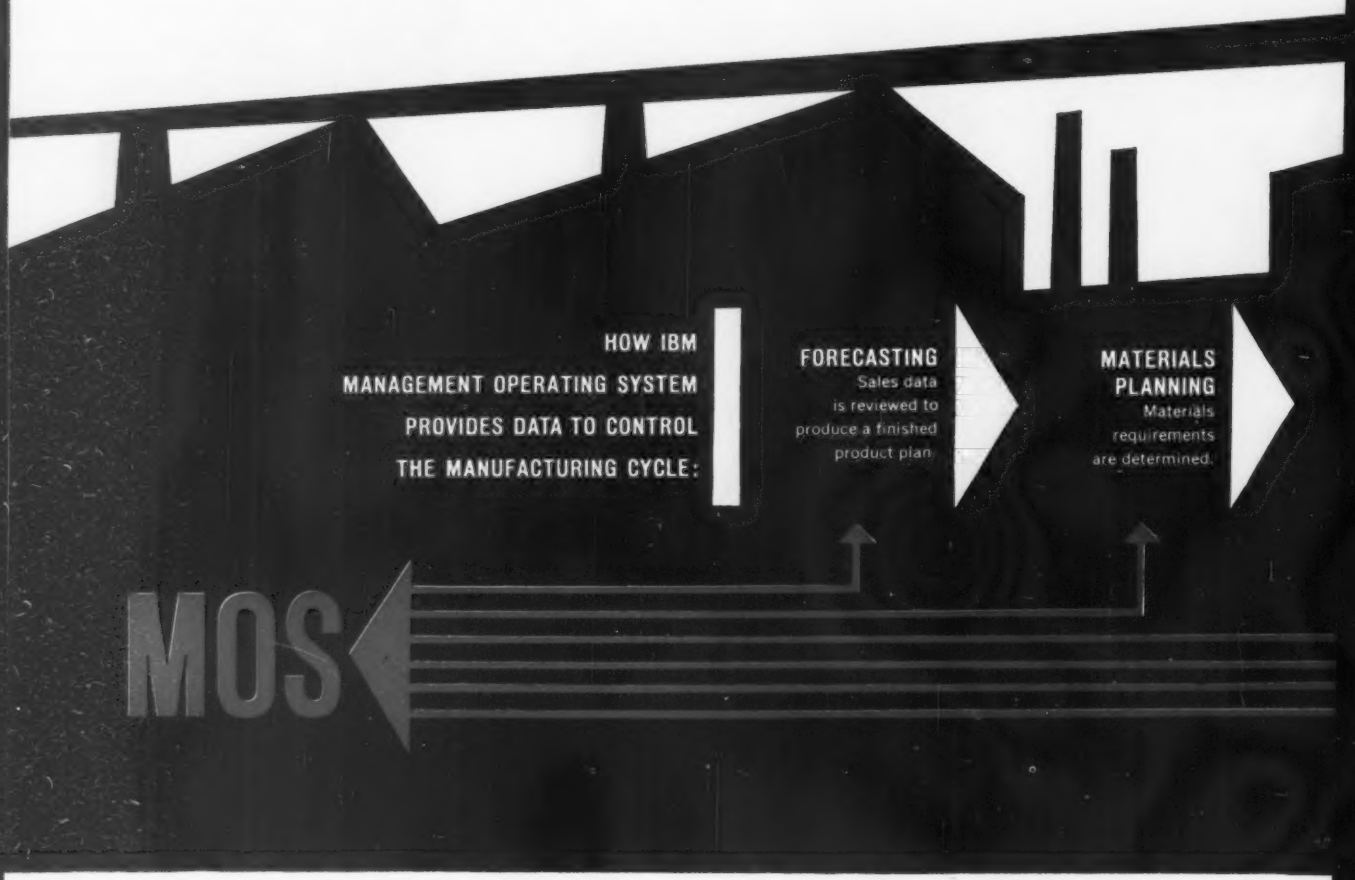
IBM MANAGEMENT OPERATING SYSTEM

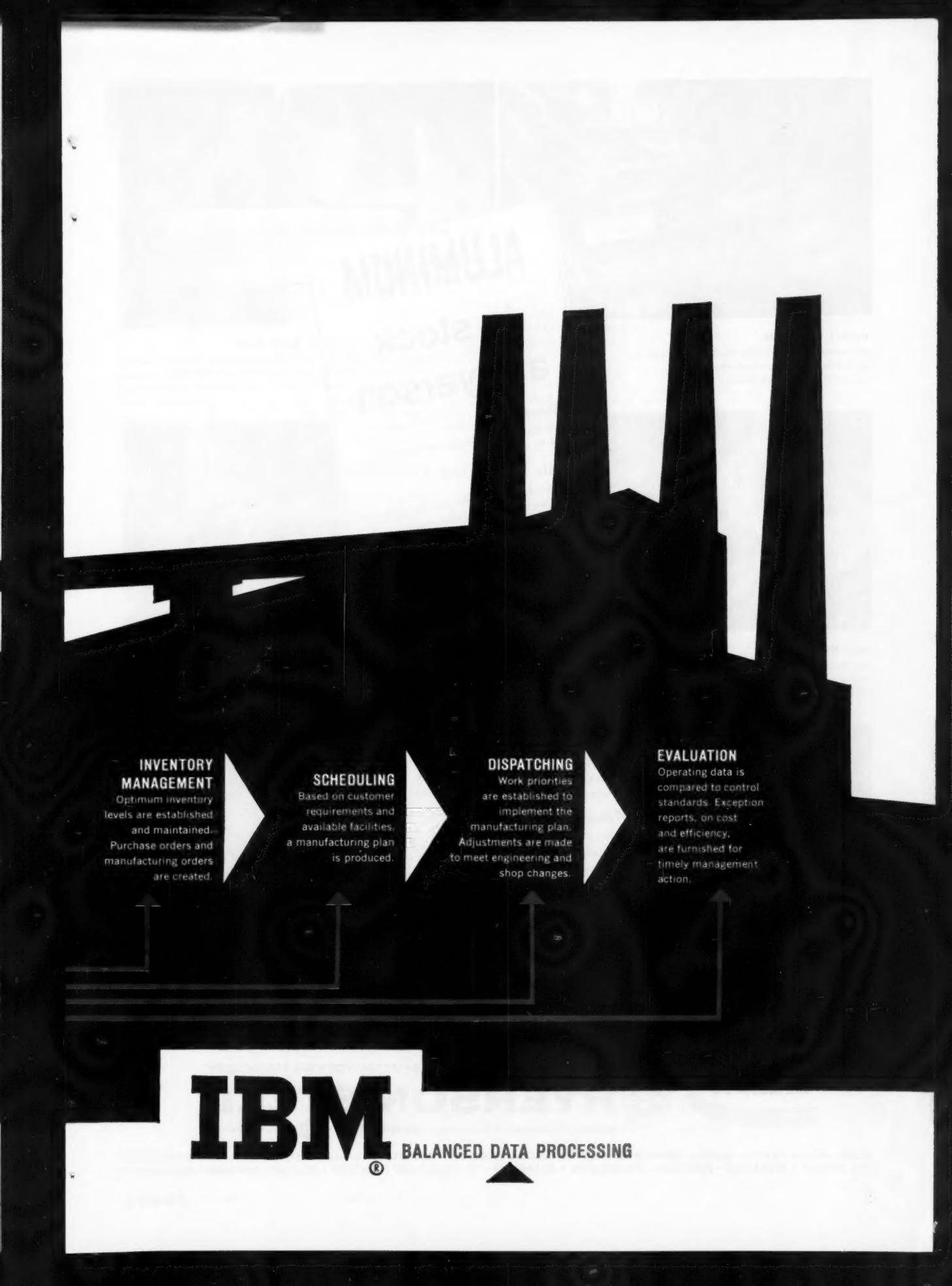
To coordinate planning and control functions continuously throughout the manufacturing cycle IBM has developed a unique Management Operating System. This system makes use of existing IBM data processing equipment, proved in thousands of industrial installations.

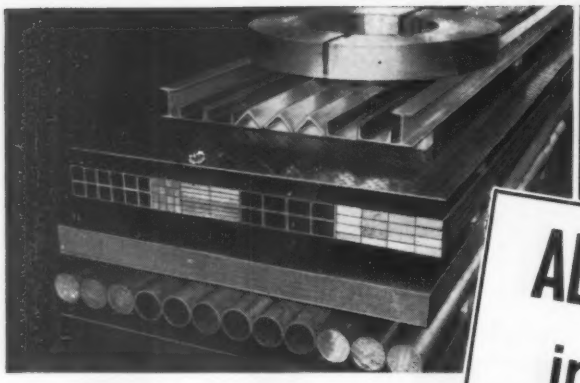
WHAT IS THE IBM MANAGEMENT OPERATING SYSTEM?
MOS is a data processing technique that provides the information needed to control your manufacturing cycle. It is designed to handle automatically the decision data required to carry out related functions, from planning and operations control to evaluation. It provides accurate data on a continuing basis . . . in time for effective management decisions.

WHO CAN USE MOS?
The IBM Management Operating System is a flexible technique that can be applied to most types of industrial operations. Every manufacturing operation is unique, however, and IBM manufacturing representatives have been trained to work with you to adapt the basic concepts to your needs. This is an important aspect of IBM Balanced Data Processing—compatible equipment backed by complete services. It gives you comprehensive support in applying the system to your company's operation.

For full information about the IBM Management Operating System, contact your local IBM office.


HOW IBM MANAGEMENT OPERATING SYSTEM PROVIDES DATA TO CONTROL THE MANUFACTURING CYCLE:
FORECASTING
Sales data is reviewed to produce a finished product plan
MATERIALS PLANNING
Materials requirements are determined.
MOS


INVENTORY MANAGEMENT
Optimum inventory levels are established and maintained. Purchase orders and manufacturing orders are created.
SCHEDULING
Based on customer requirements and available facilities, a manufacturing plan is produced.
DISPATCHING
Work priorities are established to implement the manufacturing plan. Adjustments are made to meet engineering and shop changes.
EVALUATION
Operating data is compared to control standards. Exception reports, on cost and efficiency, are furnished for timely management action.
IBM®
BALANCED DATA PROCESSING



WIDEST SELECTION
At Ryerson you choose from the nation's largest and most diversified stocks—available to meet your smallest or largest needs.

SHEET PLAN
eliminates scrap. We can produce exact lengths and widths from coil stock for most users—usually on a net-weight basis.

ALUMINUM in stock at Ryerson

Sheets
All thicknesses, alloys and tempers—cut to any size.

Coils
Thicknesses from .008 to .125—slit to any width . . . cut to any length.

Plates
Thicknesses from .250 to 4". Also tooling plate.

Rod
Rounds, ⅛" to 8" dia., cut or stock sizes; hexagons, 3/16" to 3" dia.

Bar
Squares, ¼" to 4" dia.; rectangles, ⅛" x ⅜" to 3" x 6".

Structural Shapes
Angles, channels, tees and I-beams.

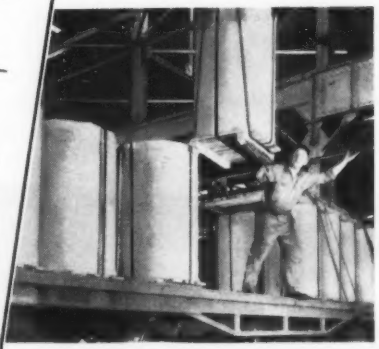
Extruded Architectural Shapes
Angles, channels, tees, I-beams, thresholds, sills, handrails, gravel stop, and coping.

Tubing and Holobar
Round, 3/16" to 6" diameter. Also square and rectangular tubing.

Pipe
⅛" to 6" diameter, to 20' lengths.

Roofing and Siding
Corrugated, insulated wall, V-beam, ribbed siding, roof deck—plain or embossed. Accessories, too.

HELP IN SELECTION
Your Ryerson representative can recommend the best aluminum alloy for each application to do the job faster, better—at less cost.



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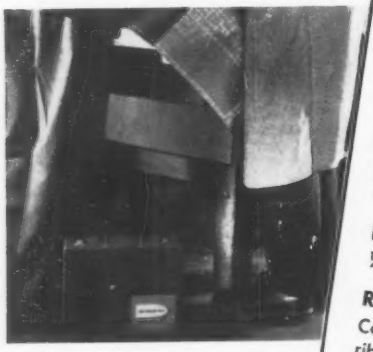
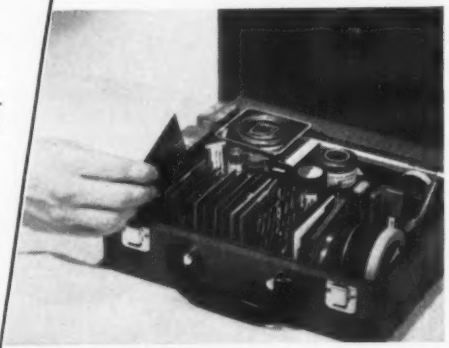
Finest care in handling and packaging and production-line-timed shipments assure fastest service. Any quantity—when you need it.



HELP IN FABRICATION
Experienced aluminum specialists are always ready to assist you with technical fabrication problems.



BE "METALOGICAL"
All of Ryerson's many extras and advantages add up to one big plus value for you: optimum value for every purchasing dollar. So be "Metalogical"—call Ryerson.

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How First Quarter Stacked Up

The Department of Commerce reports on the state of the economy during the first quarter of 1960 (figures are seasonally adjusted at annual rates in billions of dollars):

	1960 1st Q	1959 4th Q	1959 1st Q
Gross national product	500.2	483.5	470.4
Personal consumption expenditures	321.1	317.0	303.9
For durable goods	43.7	42.8	41.3
Gross private domestic investment	79.2	69.7	70.0
New construction	40.4	39.2	39.7
Producers' durable equipment	28.1	27.5	23.9
Change in business inventories	+10.6	+3.0	+6.3

April Business Barometers Mixed

April business failures rose 6 per cent from the year-earlier mark (to the highest level in two years), while new business incorporations dropped 11.4 per cent from the March figure and 12.3 per cent from the record set in the year-earlier month, Dun & Bradstreet reports . . . April orders for new freight cars jumped to 5551 from 1959 in March and 3736 in April of last year, says American Railway Car Institute . . . New orders for industrial supplies and machinery in April dropped 2.5 per cent from the March total, says American Supply & Manufacturers' Association . . . April new orders for resistance welding equipment dipped 8 per cent below the March total, reports Resistance Welder Manufacturers Association.

Steel Chief Outlines Attack on Imports

"The ten years ahead will be difficult for the steel industry. Exports will decrease and . . . imports will increase," E. B. Germany, president, Lone Star Steel Co., told a Conference Board meeting. "To cope with the foreign situation, we must carry on a relentless drive toward greater efficiency, greater productivity per manhour, a war against waste, and . . . improve our distribution and marketing methods and practices." He said there must be some serious soul searching by management and by Big Labor to curb job losses.

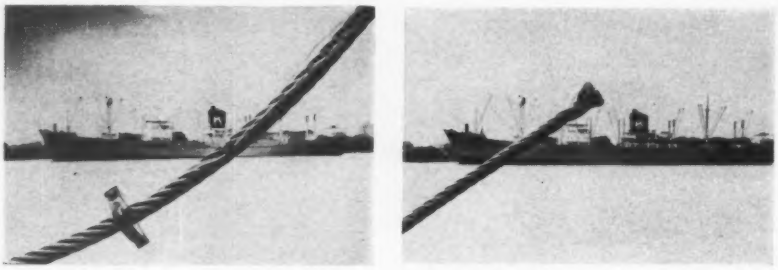
Machine Tool Orders Plummet

April net new orders for metal cutting machine tools dropped to $36.75 million from $48.45 million in March, reports National Machine Tool Builders' Association, which contends the "drop is not too significant." Tight money is holding back some purchases; other buyers are waiting to place orders until they see what will be exhibited at The Machine Tool Exposition-1960 in Chicago this September. Still other plants delayed spending plans early this year when the business outlook was foggy. With the present return to optimism

Technical Outlook—Page 67 Market Outlook—Page 105

(Page 35), purse strings may be unleashed soon. April orders for metal forming tools totaled $14.9 million—up $1.4 million from March, thanks to foreign orders.

Another Job for Explosives



From "cast off" to "blast off." That will be the transition in nautical terminology, if Thiokol Chemical Corp. has its way. The firm has developed an explosive kit (photo) to fit around mooring cables. It explodes on electrical command, severing the cable. The shape of the charge is important; by varying it, Thiokol can cut straight lines or follow irregular contours.

Appliance Industry's First Quarter Mixed

Here's a comparison of factory unit sales volume in 1960's first quarter vs. 1959's first quarter for various appliances:

Gas fired furnaces	− 8.2%	Gas incinerators	+29.8%
Gas conversion burners	+20.2	Laundry appliances	− 7.0
Gas ranges	− 1.2	Vacuum cleaners	+ 3.7
Electric ranges	− 3.5	Electric refrigerators	+ 1.2
Gas water heaters	−14.9	Electric dishwashers	+16.0
Electric water heaters	−13.6	Electric waste disposers	+ 6.0

Source: National Electrical Manufacturers Association, Gas Appliance Manufacturers Association, Vacuum Cleaner Manufacturers Association, American Home Laundry Manufacturers' Association.

April Poor for Many Appliances

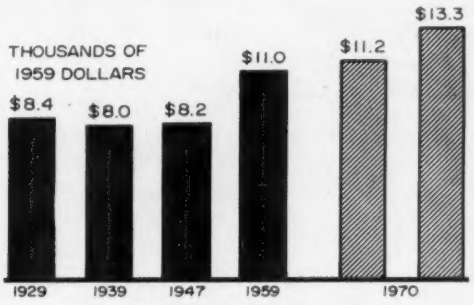
April sales of home laundry appliances dropped 28 per cent below the March level and 15 per cent below the April, 1959, mark, reports American Home Laundry Manufacturers' Association . . . April sales of gas water heaters lagged 18 per cent below those of the like '59 month, says Gas Appliance Manufacturers Association . . . March factory sales of phonographs fell 26 per cent below the February pace, but the '60 showing still exceeds that of 1959, indicates Electronic Industries Association . . . Gibson Refrigerator Div., Hupp Corp., says April marked the 22nd consecutive month in which its sales increased over the like month of the previous year.

GE Puts Appliance Inventories in Line

On June 10, General Electric Co. will lay off 280 workers in the home laundry and range departments at Appliance Park; its refrigerator department will be closed down for four days this week. Reason for the cutback: To bring inventories more in line with the anticipated sales level. A GE spokesman told STEEL the reduction does not result from a sales downturn. He said GE expects 1960 sales to equal or slightly exceed 1959 volume "and our industry can do nicely on years of 1959 quality," he added. Many appliance makers overestimated the share of the market they would garner this year.

Industry to Better Equip Its Workers

This Conference Board chart shows the striking uptrend in industry's capital investment per worker. High and low projections for 1970 are shown.



Montana Closer to Getting Steel Mill

Webb & Knapp Inc., giant real estate firm, is set to become the nation's newest steel producer. If plans work out, the company will build a plant adjacent to Anaconda Co.'s copper properties in the Butte, Mont., area to process the slag produced as a byproduct of copper smelting (STEEL, Sept. 28, 1959, p. 81). Present plans call for electric furnaces with annual capacity of 350,000 tons of steel. (About 1 million tons of slag would have to be processed). Anaconda slag reserves now total 40 million tons—and 1000 tons are added daily.

The Manager of the Future

He "is going to have to broaden his horizons and consider economic forces beyond his own business, beyond his own products. He must see how his business fits into that of the community, the nation—the world." So asserts John D. Leary, vice president-personnel, Chrysler Corp. Requirements: Broad knowledge, power to organize, ability to make quick, responsible decisions. Knowledge needed: Capital flow, psychology, technological advances, marketing, great literature.

Will Castro Seize Nicaro Nickel for the Reds?

Indications are mounting that the Castro government would like to make a deal with the Russians for the output of the American-owned nickel complex at Nicaro, Cuba. Russian trade missions to Cuba have been frequent lately; Russia is a nickel-short nation. No nickel has been shipped out of Nicaro since March, when new taxes went into effect. In April, an American ship was refused permission to load the nickel oxide sinter which the plant produces unless a tax of 25 per cent of the value of the cargo was paid. The ship left empty. Negotiations continue between the U. S. and Cuba, but Nicaro's future doesn't look bright.

Pressmaker Sees Trend to Aluminum, Plastics

William H. Bennett, president, Hydraulic Press Mfg. Co., a division of Koehring Co., Mt. Gilead, Ohio, says there's a strong trend in the auto industry toward lighter parts, especially aluminum diecastings and plastic

molded items. His firm is building several diecasting machines to be used by carbuilders to make engine blocks. HPM is also building a 1500-ton plastic extrusion press for a French refrigerator maker—to produce the entire lining for refrigerators. The firm expects its 1960 sales to be 7 per cent better than those of 1959, Mr. Bennett told STEEL.

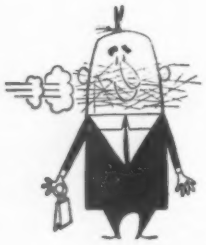
Air Force Breaks the Babel Barrier

Rome Air Development Center has developed an electronic device that translates Russian into English at 35 words a second. Heart of the device: A dictionary in a disc that stores 550,000 Russian-English words in an area the size of a postcard. Any word on the disc can be located in 1/300 of a second.

Army Passed Buck in Mitsubishi Case

Following STEEL's analysis of a locomotive contract to Japan's Mitsubishi (STEEL, May 23, p. 92), a White House source agrees that the American bidder, Fate-Root-Heath Co., had a good case. "Indeed, the engineering report (unfavorable to Mitsubishi) is the best and only basis for awarding a contract. But a reversal of the decision now would probably cause an international incident." Crux: The Army passed the buck to Office of Civil and Defense Mobilization and put it in an almost untenable position. Says the White House source: The Army should have rejected the bid itself.

Straws in the Wind



Henry Ford II, president, Ford Motor Co., predicts 1960 will be the second best sales year in the industry's history . . . Westinghouse Electric Corp. has a letter of intent from Southern California Edison Co. to build a 360,000-kw atomic powerplant . . . Electronic Industries Association says its industry's annual volume will hit $20 billion by 1970—about double current sales . . . In 1959, 26 per cent more firms got licenses to use radioisotopes than in 1958, reports Commerce Clearing House, Chicago . . . Buick, Oldsmobile, and Pontiac will introduce new small cars this fall. . . . "By 1970, we'll need 70 million new cars (a 7 million annual average), based on the present growth rate in ownership and estimates of the population increase in the '60s," declares George P. Hitchings, vice president-economic research, American Airlines (formerly Ford economist).

Metalworking Pulse

The Business Trend: For the third consecutive week, STEEL's industrial production index reads 162 (1947-49 = 100). **Autos:** The lack of Saturday work over the Memorial Day weekend cut output during the latest week. **Steel:** Output dropped below the 2-million-ton-a-week level for the first time (except for strike and holiday weeks) since early December, 1958.

- **INDUSTRIAL PRODUCTION**
  - Week ended May 21 .... **162†**
  - Year ago **172**

  Details on Page 55
- **PASSENGER CAR PRODUCTION**
  - Week ended May 28 .. **142,000***
  - Year ago **117,372**

  Details on Page 51
- **INGOT PRODUCTION RATE**
  - Week ended May 29 .. **66.9%†**
  - Week ago **71.3%**

  Details on Page 105

†Preliminary. *Estimated.

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INTEGRAL FIN U-TUBES
for HEAT EXCHANGERS and REBOILERS

Now get steel integral fin or plain U-tubes on pallets from one source! Michigan Seamless has TAILORED TUBING, tailored to your specifications and ready for your heat exchanger. Buy TAILORED TUBING for minimum handling, minimum shipping cost, no scrap loss—deliveries on time! A variety of lengths, wall thicknesses and alloys, radii up to 24". Contact your Michigan Seamless representative. In the Southwest, call Gulf States Tube Corporation.

MECHANICAL, AIRCRAFT, PLAIN AND FINNED HEAT-EXCHANGER TUBING

MICHIGAN SEAMLESS TUBE COMPANY
SOUTH LYON, MICHIGAN

A SUBSIDIARY:

GULF STATES TUBE CORPORATION
ROSENBERG, TEXAS

RELIABILITY:

Reason enough to buy LeBlond

See LeBlond Booth 810 at the Machine Tool Exposition in Chicago, September 6—16.

Valuable as five fingers on a hand, these five great LeBlond lathes run round the clock, year in, year out, at the Warren, Ohio, shops of Wean Manufacturing Co. Wean has six LeBlonds in all, including the five in the picture, all purchased in the last five years.

The operations they perform are typically job-shop. Lots are small—five parts alike are a big run; materials may vary from hardened steel to copper. Fat mill rolls, long whippy spindles, sturdy stepped shafts—the rugged LeBlonds take them as they come and turn them quickly and accurately, regular as clockwork.

Much of Wean's output goes into steel mill equipment that can be relied on to hold up under the most exacting requirements—the same steadfast degree of reliability that LeBlond lathe customers expect, and get.

RELIABILITY is a good reason to buy a lathe. It is reason enough to buy LeBlond.

Why Worry About 1961?

Some people still think the U. S. is heading for a recession in 1961.

We find no evidence to support their position.

First, let's consider the long term future.

Even though 1960 got off to a slow start, there have been few changes in the factors that will make the nineteen sixties the most prosperous decade the U. S. has yet experienced.

A new study by the National Industrial Conference Board makes this clear. Based on projections of historical trends and certain commonly accepted assumptions, the gross national product could rise to $800 billion by 1970—from $500 billion currently and $480 billion in 1959.

Other projections:

Total labor force will climb from 73.6 million this year to 87.3 million by 1970.

There will be a 37 per cent increase in professional, technical, and managerial men, little change in the number of skilled workers, and a 12 per cent decline in the number of farm workers.

Output per manhour will continue to climb at the postwar rate of 3.2 per cent.

The average number of hours worked weekly will continue to decline.

Outlays for research and development will more than double, reaching 4 per cent of national output.

Capital expenditures to equip workers for more efficient production must average $58 billion annually in the ten-year period and reach nearly $70 billion by 1970 vs. $45 billion in 1959.

Against that backdrop for the decade, STEEL's air safari editors find that most businessmen are optimistic about the near term. (See the final report, Page 35.)

Sales are above year ago levels. Defense spending is edging upward. Many steel users have completed inventory adjustments. Steel ingot output still may exceed the 1957 record output of 117 million tons.

However, domestic and foreign competition in most lines is fierce.

So the emphasis is on more production efficiency, more market research, more sales promotion, and more aggressive marketing.

We are in a solid year, which most people confidently expect will carry on as we get deeper into this promising new decade.

Why worry about 1961?

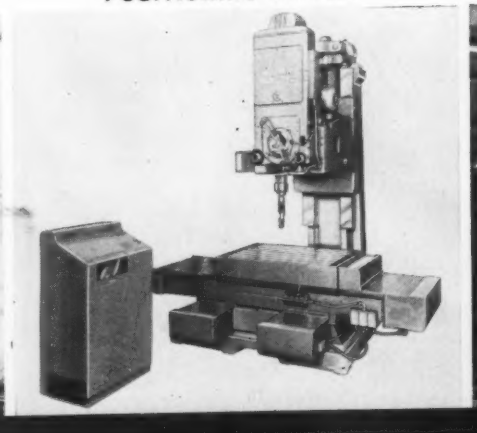
Irwin H. Such

EDITOR-IN-CHIEF

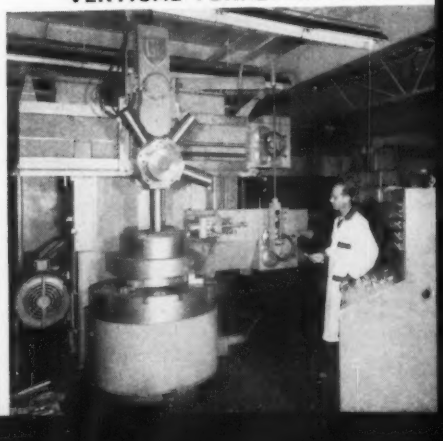
EXPERIENCE

CONTOUR MILLING MACHINES

POSITIONING TABLES



VERTICAL TURRET LATHES



to help you into tape

from the people who developed the first commercially available tape-controlled machine tool

While there is a profitable place for numerical control in nearly every plant, the final decision to go into tape depends upon a number of economic and manufacturing considerations. You can come with confidence to Giddings & Lewis to discuss these considerations.

Giddings & Lewis pioneered tape-controlled machine tools . . . has produced more major machines with numerical control than any other builder . . . has developed its own control systems . . . uses tape-controlled machines extensively in its own shops . . . and has established a numerical control research, development, testing, and programming center unique in the industry.

Giddings & Lewis machine tools are available with G&L Numeripath* magnetic tape continuous-path control or G&L Numeripoint* punched tape discrete positioning control, as well as with other makes of control systems. These machines are specifically designed and manufactured to be operated under tape.

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FIRST tape-controlled contour milling machine.

FIRST tape-controlled vertical boring mill.

FIRST tape-controlled vertical turret lathe.

FIRST tape-controlled die sinking machine.

FIRST tape-controlled horizontal boring, drilling, and milling machine.

FIRST machine tool builder to develop and manufacture its own numerical controls.

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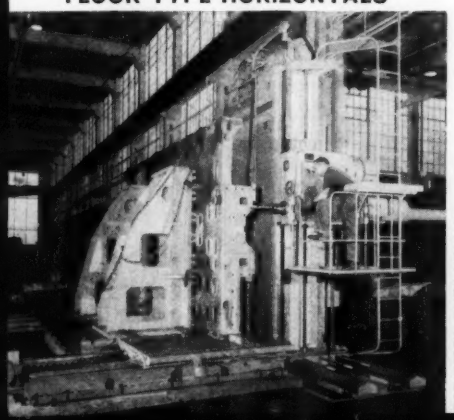
FLOOR TYPE HORIZONTALS



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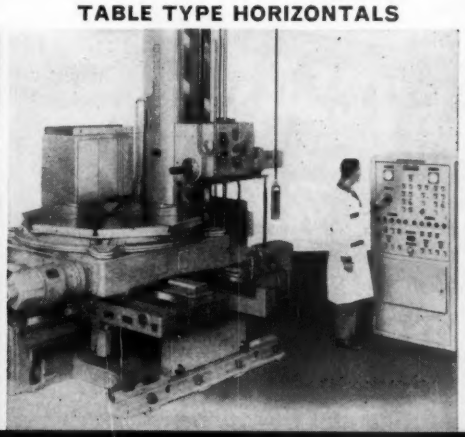
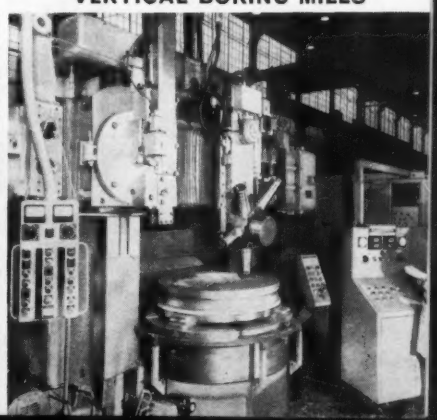


VERTICAL BORING MILLS



Rugged Cleveland Speed Reducer gives Birdsboro cooling bed fast, dependable shuttle bar lift

For the tough, competitive years ahead, leading rolling mill operators are finding the key to maintaining mill profits in properly designed, dependable equipment that quietly works around-the-clock, year in—year out.

Such a mill unit is this Birdsboro mechanical cooling bed installed in a prominent mid-western steel producer's plant. It utilizes a 500-AH heavy-duty Cleveland Worm Gear Reducer to drive the bed's shuttle bar lift mechanism.

In steel rolling mills all over the world, rugged Clevelands are hard at work, as efficient as the day they were installed—some as long as 37 years ago. Specify Clevelands whenever a quiet, dependable, maintenance-free method of power transmission is vital. Write for free Bulletin No. 145—it gives the complete "Cleveland Story". Or better yet, contact your nearest Cleveland Representative today.

CLEVELAND
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Speed Reducers

Cleveland Worm & Gear Division
Eaton Manufacturing Company
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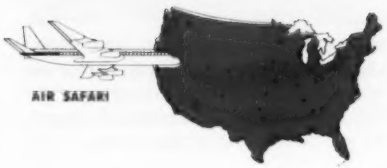
'60—Solid All the Way



That's what STEEL's editors see for metalworking. They've just completed a coast-to-coast air safari, visiting some 200 executives in 32 major metalworking cities. Their findings:

- Metalworking sales are turning up.
- Price competition is severe.
- Executives are optimistic—a record sales year seems certain—and most managers expect the solid pattern to extend into 1961.
- Aggressive marketing is paying off.
- Emphasis on new product development is prodigious.
- Profits are suffering.
- Weak spots: Capital goods and agricultural equipment.

CALL IT "boomless prosperity," "sterling stability," or whatever you want. Just be sure to recognize that metalworking is having a record sales year.

No, it won't live up to predictions made six months ago. Yes, it's bringing a deluge of profit problems. But first half sales are headed for a peak. And many managers predict record dollar sales for the year.

The uncertainty that tainted the business outlook a few months ago is fast dissolving into optimism. The 200-plus executives contacted by STEEL's editors on their coast-to-coast air safari are almost uniformly optimistic. Even in the so-so capital goods and farm equipment industries, you find plenty of bullishness. And it's generally coupled with enthusiasm over new products, or a new marketing plan, or the results of a vigorous war against costs.

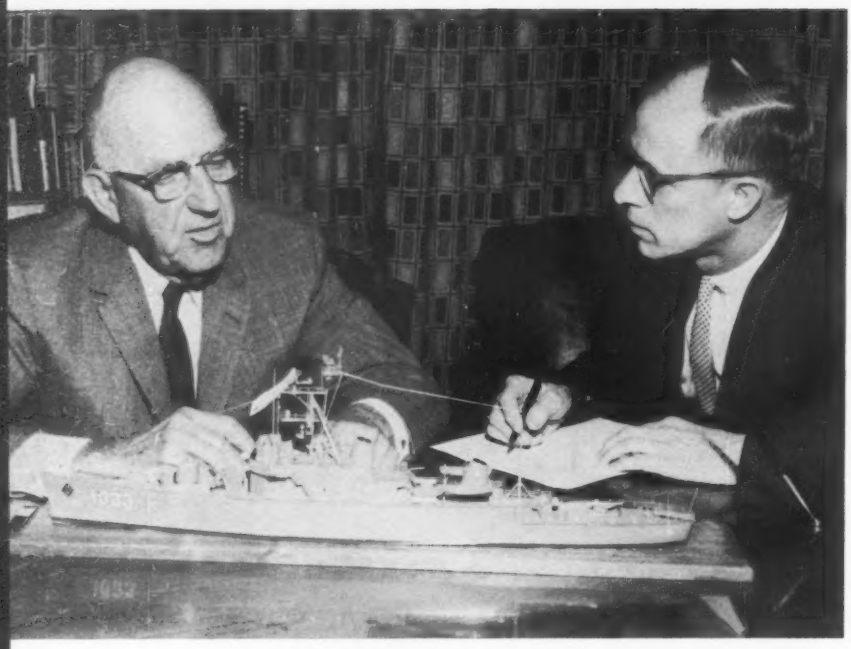
• **Aggressive Selling**—The air safari editors are impressed by the concerted and extensive marketing plans of metalworking companies—of all sizes, in diverse industries, in every part of the country. Sales forces are being expanded, budgets hiked, new ideas promoted, sales incentives developed, market research intensified. A noticeable trend: Companies are trimming production costs and investing the savings in marketing programs or in research and development.

• **Product Parade**—It's tough to find a sizable metalworking company that has no new products. And most of the small firms are in the act too. From the screw machine product maker that plans to revolutionize baseball spikes to the capital goods producer with a complete new line of machines, the tenet in metalworking is "devise a better product or die." For the buyer, it means a wider choice than ever before—and it signals the need for more discriminate purchasing practices.

• **Profit Problems** — Record sales this year may not bring record profits. Price fighting prevails in almost every segment of metalworking. Many companies are churning about in a state of profitless prosperity—others are taking jobs at cost to keep their workforces intact and their overhead paid. Still others are being pressured by dealers to lower their prices. Reason: There's plenty of price cutting at that level too.

Where will it end? Most managers shake their heads and stare at the floor. They mention only two solutions: 1. Wait hopefully for a boom to strain the industry's capacity so that large—and in some cases, long overdue—price increases can be put through and made to stick. 2. Trim costs at every turn. Many firms are taking the latter route with extraordinary success, the editors find.

For the final air safari report—on the Gulf States—turn page.



NEW ORLEANS—James H. Bull, president and chairman, Avondale Marine Ways Inc., tells Associate Managing Editor Vance Bell: "Business is about 10 per cent ahead of last year's."

AIR SAFARI NO. 5

Gulf Staters Expect Metalworking Growth

DOWN WHERE cotton is king and oil is gold, metalworking is on the move. In fact, many say this may be the best year on record. Although there are problems in the Gulf Coast area, one Texas businessman told STEEL's air safari editors: "The growth in our area is accelerating at such a pace that we can't help but be confident."

• **Impact of Imports**—Gulf Coast businessmen have been among the hardest hit by foreign competition, but they're fighting back. Recent price reductions by some Southern makers of reinforcing bars should help structural steel fabricators such as North Texas Steel Co. Inc., Ft. Worth. Says William Howard Jr., president: "Rather than use foreign steel, we are improving our own efficiency by covering over some of our acreage so the men can work better in all types of weather."

In Houston, Herbert Allen, vice president of Cameron Iron Works, views the foreign situation a little differently. "The export of oil country equipment is gradually diminishing because of foreign competition. It can't be stopped. Either you join them or sit back and see the business slip away. We are building abroad and diversifying our product mix domestically."

• **Filling the Gap**—Tom E. Gray, president of Rowe Machinery & Mfg. Co., Dallas, gives credit to new products for the highest level of business in his company's history. Coil handling equipment developed two or three years ago is just now showing up on the books, he claims. "There is more and more sheet metal work going on in the South, and equipment has to be updated."

In New Orleans, James H. Bull, president and chairman of Avondale Marine Ways Inc., says: "We wouldn't be running ahead of last year if we hadn't expanded into construction of big ships."

• **Profit Squeeze**—Competition is severe, points out R. N. Habans, executive vice president, Orleans Materials & Equipment Co. Inc., New Orleans. "It's increasingly difficult to make a profit. But business conditions in general in the Gulf Coast area are better than average."

It's going to take more hard work and economy than ever to make a profit this year, feels Jack Pace, president and general manager of General Steel Co., Ft. Worth. "There are a lot of contracts on the boards. It will be the healthy companies which will come out of this all right."

HOUSTON—"At least 50 per cent of our sales are products we didn't make two years ago," declares Herbert Allen, vice president, Cameron Iron Works. "Our sales are up substantially."

DALLAS—E. B. Germany, president, Lone Star Steel Co., tells Associate Editor Bob Jaynes: "We're building inventories for anticipated stronger sales in the second half."

NEW ORLEANS—"Competition is severe, and it's becoming increasingly difficult to make a profit," states R. N. Habans, executive vice president, Orleans Materials & Equipment Co. Inc.

• **Upsurge in Gas**—Few people connected with the oil industry will deny that they are having problems. Fred Carlson, director of business research for Dresser Industries Inc., Dallas, believes that the seasonal pickup in oil well drilling in the second half will be less than usual this year. However, demand for gas transmission equipment is strong, so that on balance, Dresser's business in 1960 will be up a little from 1959's.

Day McNeel, executive vice president of Rio Grande Eastern Corp., Houston, says: "With improving demand for gas, gathering systems for hitherto unused shut-in wells should about double in the next five years, calling for significant tonnages of pipe and equipment."

E. B. Germany, president of Lone Star Steel Co., Dallas, observes that oil drillers have just about used up their inventories of equipment and are ordering hand to mouth. The operating rate at Lone Star will go down farther before it turns up, but Mr. Germany is looking for a year somewhere between the good levels of 1957 and 1959.

DALLAS—Fred Carlson, director of business research, Dresser Industries Inc., reports: "While oil country goods are off now, there is strong demand for natural gas supplies."

• **Metalworkers Busy**—Generally, metalworkers are having a good year. W. S. Nicholson, manager of industrial sales, Texaco Inc., indicates the state of business when he reports that sales of cutting oils and other metalworking fluids are up 18 per cent. So far this year, the gain for all industrial products is only 10 per cent.

D. T. Turnbull, vice president and secretary of Woodward Iron Co., Woodward, Ala., expects a moderate improvement over 1959 the rest of this year. He sees a pickup in housing starts, which affects his business.

• **Exceptions**—But not all businesses are finding 1960 on an uptrend. John W. Little, president of Goslin-Birmingham Mfg. Co., Birmingham, tells us that first quarter was slow, and there is no rush of inquiries to indicate anything different for the foreseeable future. And Robert I. Ingalls Jr., chairman of Ingalls Iron Works Co., Birmingham, feels the construction industry is generally in a slump. "I don't see any chance for a change within the next three or four months."

HOUSTON—"Sales of our metalworking fluids are 18 per cent above those of similar 1959 period," states W. S. Nicholson, manager, industrial sales, Texaco Inc.

AISI Stresses Steel's Competition

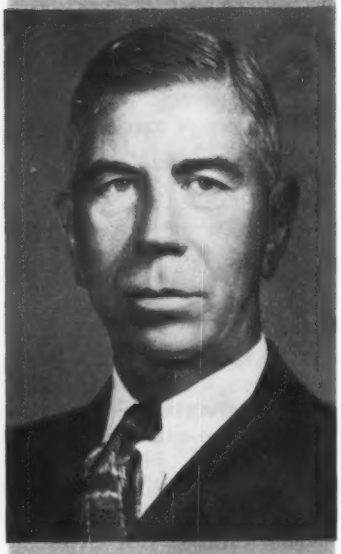
THE URGENCY of meeting both domestic and foreign competition and the need for depreciation reform were stressed by speakers at the general session of the American Iron & Steel Institute's 68th general meeting in New York last week.

Four basic problems, with competition as their common denominator, face the steel industry, stated Benjamin F. Fairless, AISI president. At the top, he placed the achieving of labor peace, followed by improving efficiency in plant operation, combating rising competition from other materials and low cost steel produced abroad, and maintaining a fair level of profits to attract needed capital for essential improvements and expansion.

BENJAMIN F. FAIRLESS
AISI president

JOEL HUNTER
President, Crucible Steel Co. of America

LESLIE B. WORTHINGTON
President, U. S. Steel Corp.



C. M. WHITE
Chairman, Republic Steel Corp.

• **Better Communications** — While many factors are involved, Mr. Fairless said one thing is clear on the labor issue: "The companies will need to do a more effective and convincing job of explaining their problems to employees, unions, communities, and the country. True understanding of the problems is seldom achieved overnight or by short term or high pressure programs. We must keep everlastingly at it."

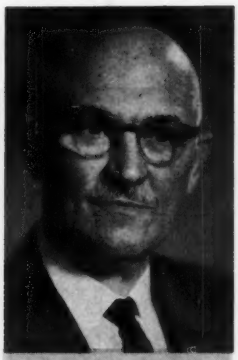
Many in the industry, including many thousands of steelworkers, do not understand the critical nature of our competition, emphasized Mr. Fairless. Increasing efficiency of operations represents a twofold requirement: Real co-operation by the unions and employees and constant improvement in production technology, he stated. While many people believe we can compensate for the foreign wage differential with superior technology, American industry has no monopoly on modern efficiency, ingenuity, or research, he added.

• **Marketing Aggressiveness** — The keystone of steel's progress is the sale of its products in ever greater volume "against some of the toughest, most resourceful competition we have ever faced," emphasized Leslie B. Worthington, president, U. S. Steel Corp. Responsible individuals must be charged with the broad strategy and detailed tactics to meet this competition, he stressed.

Companies must hit competition from other materials head on, application by application, and customer by customer, urged Mr. Worthington. They should establish and maintain contact with customers beyond the purchasing agent—with design groups, engineering departments, research or-

These Men Won AISI Awards

E. J. HANLEY
Allegheny Ludlum Steel Corp.



J. S. McMAHAN
Steel Co. of Canada

H. A. PARKER
U. S. Steel Corp.

PROF. GEORGE WINTER
Cornell University

ganizations, and even with the styling studio, he said.

"I am concerned that steel does not get out-sold, out-promoted, out-advertised, and out-foxed in applications where steel is the right material from an engineering, economic, and esthetic point of view," he warned.

While low priced imports present a tough problem, Mr. Worthington believes American producers are equal to handling it. "Let us begin by selling much harder those things that the foreign producer cannot offer: Service, quality, and availability."

• **Depreciation Reform**—U. S. depreciation and tax depreciation laws are the most restrictive in the world, declared Joel Hunter, president, Crucible Steel Co. of America. Mr. Hunter believes that "dollars invested in our plants are disappearing, and we are reporting more income than we actually have because tax and accounting rules require it."

On the brighter side: He noted signs of increasing recognition in Washington of "our penny wise and pound foolish tax depreciation rules."

Max D. Howell, AISI executive vice president, reported on the many new institute activities during the past year, citing that for the first time, the institute became directly concerned with steel industry promotional activities.

• **Schwab Lecture**—The Charles M. Schwab Memorial Lecture was prepared by Earle C. Smith, chief metallurgist and director of research, Republic Steel Co., who died on May 20. C. M. White, Republic's chairman, gave the paper.

"Our margin of dominance of the world steel industry is slim," wrote Mr. Smith. "Our competition is alert and striving to catch up. Some of us are concerned over what we consider to be false values established for measuring the worth of an exceptional and gifted man. If we continue to lose highly competent, educated men, we will be operating the greatest capital establishment of the metal world with mediocre people."

• **Awards** — Institute Medals were awarded to E. J. Hanley, president, Allegheny Ludlum Steel Corp. and J. S. McMahan, superintendent of blast furnaces, Steel Co. of Canada. Prof. George Winter, head, Department of Structural Engineering. Cornell University, received a regional technical meeting award in the field of operations. Regional technical meeting awards in the field of research went to H. A. Parker, division superintendent, steel producing, Fairless Works, U. S. Steel Corp., and Philip Schane Jr., technical assistant, steel production, U. S. Steel Corp.

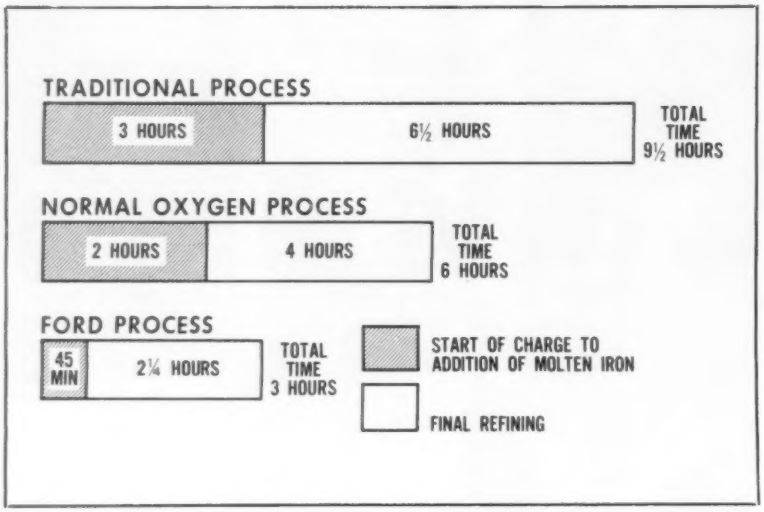
• **Technical Papers**—Oxygen lances and basic brick in the roofs of open hearth furnaces improve steel production rates and extend furnace life, stated Messrs. Parker and Schane. They said the use of oxygen produced a 10 to 25 per cent improvement in heat time and a fuel savings of 18 to 35 per cent.

E. R. Richards, director, Iron & Steel Producing Div., Acme Steel Co., discussed a new Acme plant in which the entire basic oxygen production depends on the successful operation of basic hot blast cupolas. Mr. Richards explained that the operation results in steel with a low sulfur content.

In 3 minutes, an electronic computer can yield answers to blast furnace operating problems that would require about 24 years of tests, said A. L. Hodge, associate manager, gas process development, Linde Co., a division of Union Carbide Corp. He told of his work with a mathematical "model" used for furnace control and making predictions.

Paul D. Johnson, blast furnace superintendent, Republic Steel Corp., said that automatic control is one method of reaching peak blast furnace performance and described "Stockray," a nuclear gaging system in operation on a blast furnace at Republic's Chicago plant. In over 18 months of operation, Mr. Johnson revealed that "Stockray" has never required a furnace shutdown for maintenance work and that the furnace has operated at record production levels.

New Technique Hikes Open Hearth Output



Developed by Ford Motor Co., it cuts heat time in half. Natural gas and oxygen are blown through roof lances; burned lime is used in place of limestone

CONCEIVABLY, the nation's open hearth output (it represents 80 per cent of ingot capacity) could be doubled if all furnaces were converted for the Ford technique. The company has applied for patents, and no arrangements for use of the process by other steelmakers have been made. But Irving A. Duffy, vice president of Ford's body group which includes the steel division, hints that licensing fees might be waived or held to a minimum:

"We have always enjoyed cordial relationships with the steel industry. The process is mutually beneficial to all open hearth steel producers. We're willing to work out satisfactory arrangements with them."

• **How it Works**—The Ford process features two basic improvements in the oxygen lance method of making open hearth steel: 1. The company forces natural gas as well as oxygen through roof lances. 2. It uses burned lime instead of limestone in the furnace charge.

The gas-oxygen mixture creates a high initial charging temperature that speeds scrap meltdown; burned lime hastens thermal and chemical reduction of the charge. Peak temperatures are the same as those of conventional methods (about 2900° F), but the process permits charging of hot metal a half hour after scrap is loaded in the furnace. That's where the biggest savings are made: Operators normally wait an hour or more for scrap to melt before adding molten iron.

After the scrap is charged, gas is shut off in the lance, and heating continues with oxygen flow and heat from the end burners.

• **Results** — The company has tapped about 15 heats from a 200 ton and a 400 ton open hearth furnace. Heat time: About 3 hours in the 200 ton furnace vs. 6 hours with conventional oxygen lancing and 10 hours in regular open hearth practice. The company expects to pour an average of 60 tons an hour from a 200 ton furnace vs. 30 tons by oxygen lancing, or 20 tons in conventional practice.

Ford has been using a 50-50 mix of scrap and hot metal, says George Ferris, open hearth manager. He expects the process to work equally well with a charge of up to 70 per cent scrap. And it may permit significant changes in open hearth design.

• **Hold Up**—Lack of oxygen has delayed installation of the lances on Ford's other furnaces. The company will build facilities to boost its oxygen output from 50 to 300 tons a day. That's part of a three year, $35 million expansion program started in 1959. Completion of the oxygen plant and furnace conversion are timed for late 1961.

Ford is the nation's 13th largest steel producer, with an annual ingot capacity of 1.94 million tons. The company has nine, 200 ton and one, 400 ton open hearths. It also operates five electric furnaces and three blast furnaces.

New lance equipment, developed by Air Products Inc., Allentown, Pa., which worked with Ford, uses electronic controls to regulate flow and mix of gas and oxygen; that's another step toward automation of the open hearth, says Mr. Ferris. Two of the lances are used on the 200 ton furnace, and four on the 400 ton unit.

Air Products reports similar lances are being installed at a division of National Steel Corp. In addition, other lances providing 100 million Btus (compared to Ford's 50 million) are being developed for another steel company.

Labor Board Expedites Unfair Practice Cases

THE National Labor Relations Board cleared its docket of 724 unfair labor practice cases in the first quarter—the largest case load in seven years.

With 644 cases awaiting decision, the board reports that the workload is at a new high since passage of the Taft-Hartley Act 13 years ago.

A slowdown in complaints issued by the General Counsel is providing some relief. The three month total was 273 compared with an all-time high of 369 in the last quarter of 1959.

In the first quarter, unfair labor practice cases filed against employers totaled 1905 compared with 2280 in the corresponding period of 1959.

Unions filed 37 per cent of the unfair practice cases, employers 12 per cent, employees 51 per cent.

In the 1411 collective bargaining elections conducted by the agency, unions won majority designation in 825 elections, or 58 per cent.

Of the cases pending at the end of March, charges of unfair labor practices accounted for 4745 cases; petitions for various types of representation elections accounted for 2203 cases; and petitions for union shop de-authorization accounted for six.

Kennecott Opens New Mill

Kennecott Copper Corp. took a big step toward becoming self-sufficient from mine to metal when it dedicated its $30 million electrolytic copper refinery at Baltimore.

The facility, currently turning out 10,000 tons of high purity copper a month, will be operating at full capacity of 16,500 tons a month by midsummer. It means that Kennecott, which now smelts all its own copper, will be refining all but 6000 tons a month of its output. After 1965, Kennecott will refine 100 per cent of its production.

About half the blister copper for the Kennecott refinery is being shipped from company mines in Arizona, Nevada, New Mexico, and Utah, the other half from Chilean properties. Output of the Baltimore refinery will go to both U. S and foreign users.

The refinery is equipped to turn out wire bars and billets.

Furnacemakers Plan for Challenging Decade in '60s

William E. Benninghoff, president, Industrial Heating Equipment Assn.

MAKING the next decade both productive and profitable will keep the heat on industrial furnace makers, said members of the Industrial Heating Equipment Association at their annual spring meeting last week at Hot Springs, Va.

IHEA President William E. Benninghoff, Ohio Crankshaft Co., Cleveland, told the heating industry executives: "We must change our opinion of what some have called the soaring sixties, and consider them the challenging sixties." The impact of growing technology and foreign competition will be the industry's principal challenges in the years ahead, said the members.

Irwin H. Such, STEEL's editor in chief, warned of danger on the economic front, as he predicted changes and progress to come. Russian efforts to improve production will continue, he pointed out, and our own growth may lag in proportion.

• **Short Term**—The short term forecast for 1960 and 1961 is for fair economic weather but no boom, said James M. Dawson, vice president and economist of the National City Bank of Cleveland. He credited a conservative inventory policy in industry with reducing the sales level predicted earlier for 1960, and said the result will be a continued period of good business well into 1961. He predicted an increase in capital spending during 1961 which would include the furnace business.

• **Changing Technology**—Changes in materials and working of metals will affect tomorrow's usage, said Dr. Allen G. Gray, American Society for Metals, Novelty, Ohio. Citing improved alloys with greater resistance to high temperatures and corrosion, he says weldability is growing as a major criterion in the selection of new alloys. New heat treatment technology will require changes in equipment now being sold and used, he predicts. Nuclear developments, for example, require consideration of properties other than strength and toughness; some metals cannot be considered because they poison the reactor.

Corridor discussions indicate that IHEA members are looking at new materials for construction purposes, as well as facing the new heating problems which they pose in production. Higher strength levels in aluminum alloys may make its use possible in the oven field; customers are requesting furnaces capable of ultrahigh temperatures for development work on heat resistant materials.

• **Competition Abroad**—The problem of foreign competition was summarized by Horace B. McCoy, president of the Trade Relations Council, Washington. Pointing out that we have lowered tariffs, in many cases with only token reciprocal reductions, he cited this as one of the factors in the change of the U. S. from a net exporter to a net importer. Yet he does not believe that higher tariffs are an answer. Changes in the world trade pattern, he thinks, are inevitable. For example: There is a growing tendency for companies hit by imported materials to set up licensees or subsidiaries abroad.

Evaluation of First Labor-Management Summit Meeting... Mr. K's Impact on Civil Defense & Defense Spending

Meany and Reuther check signals for first labor-management summit meeting

No News Was a Good Sign

DELEGATES to the first summit conference between labor and management met secretly May 19 in Washington for over 3 hours. To newsmen waiting in the hotel corridor for some headline development, the meeting was disappointing. After Labor Secretary James Mitchell's efforts to implement President Eisenhower's suggestion that management and labor meet periodically to iron out basic differences on a national scale, the first meeting, it seemed, should have produced something more than George Meany's (president, AFL-CIO) laconic remark: The conference was "amicable and reasonable."

Besides Mr. Meany, union representatives were Walter Reuther, head of the Auto Workers, and George Harrison, head of the Railway Clerks. Management's team was made up of Rudolph Bannow, president, Bridgeport Machines Inc., Bridgeport, Conn.; William J. Grede, president, J. I. Case Co., Racine, Wis.; Leroy A. Petersen, president, Otis Elevator Co., New York; and Robert W. Stoddard, president, Wyman-Gordon Co., Worcester, Mass.

Mr. Meany acted as the official spokesman for the conferees at a brief press conference. Photographers were not allowed to take pictures, which indicates the conferees' desire to keep publicity to a minimum. At this stage of the summit, that is probably a good attitude to take.

But the first meeting did light a few sparklers. The union men want to see a bigger cross section of U. S. industry across the table from them in future meetings.

The plan is to expand the so-called "committee of six" (plus Mr. Bannow) into at least a "committee of 12." The problem of choosing six more members is a tough one when you remember that such union stalwarts as IUE's James Carey are standing in the wings and anxious to go into their antimanagement acts. Another angle: If a management man from the steel industry is chosen, then one from the steel union should perhaps be picked to balance things out.

New Look for Civil Defense?

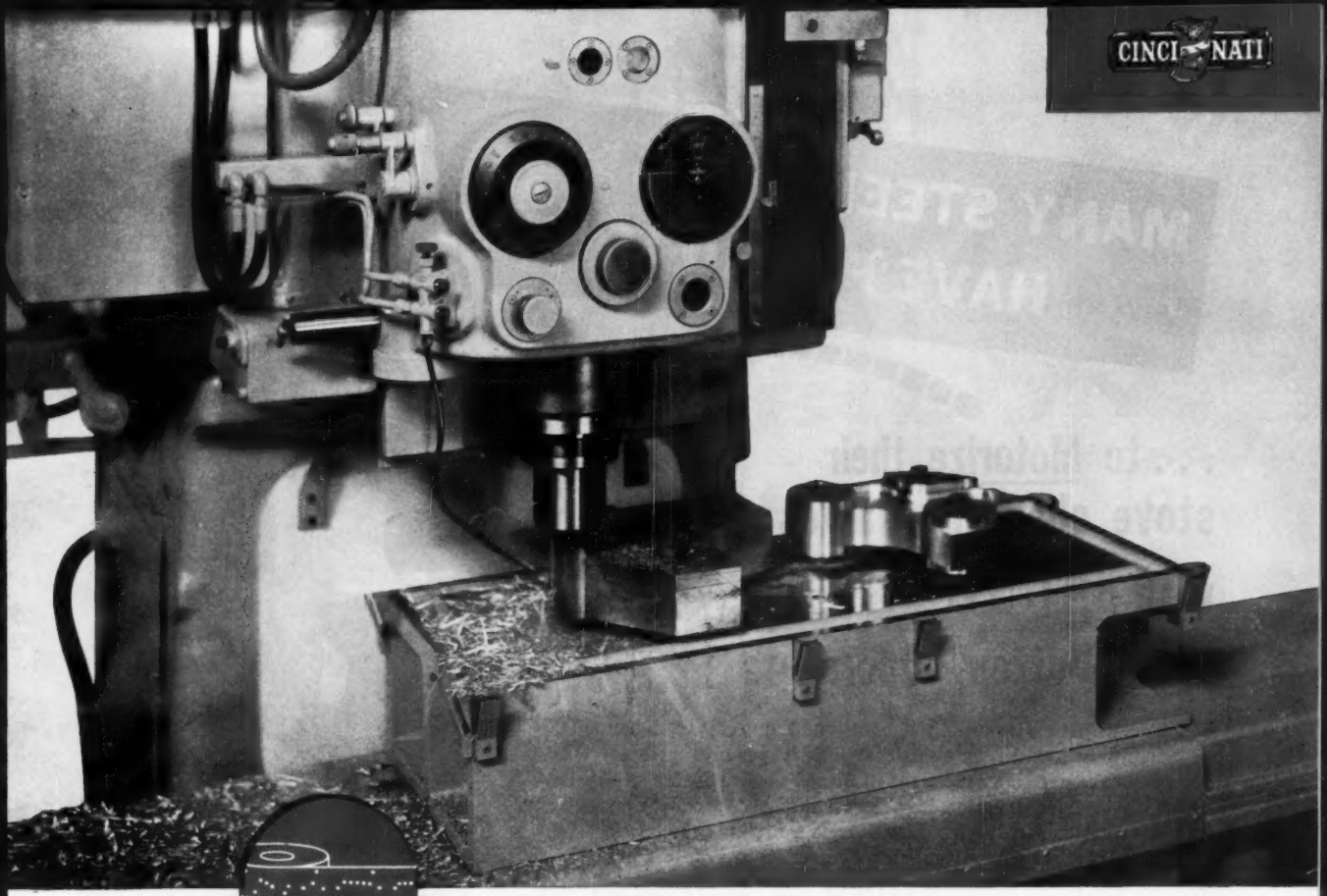
One result of the breakdown of the Paris Summit Conference may be a new attention to civil defense by the American public. Talking to the National Defense Executive Reserve last week in Washington, Gov. J. Caleb Boggs of Delaware mentioned the "marked increase" in phone calls to civil defense agencies with requests for literature.

The governor reported at least one Delaware housing development is offering a fallout shelter in each home as an option. Leo A. Hoegh, director, Office of Civil & Defense Mobilization, pointed out that at least one-fourth of the U. S. population now has protection against radioactive fallout. The need for a bigger program was expressed by Charles C. Finucane, assistant secretary of defense (manpower): "Our deterrent policy . . . might well rest upon the question of which nation could best withstand the damage that the enemy nuclear attack could inflict . . ." In the last year or so, there has been somewhat of a shift in OCDM policy from a strictly mobilization point of view to one of survival.

New Attitude on Spending

While the House modified the President's original defense budget greatly (STEEL, May 16, p. 58), it did not add much to the total budget. Following the Summit, the Senate appears more willing to spend on defense. Some senators are expected to fight hard for the Navy's new aircraft carrier, which the House cut out, and they may tone down the over-all procurement cuts which the House made in the name of efficiency.

A conference with the House would probably keep the new defense bill well within $1 billion of its present $39.3 billion (not including construction and foreign aid). Most observers agree a hike now will mean little in the way of new spending this year.



Just a simple adjustment of ACRAMATIC's Cutter Compensation Control, and this CINCINNATI 16" x 30" Hydro-Tel changes from roughing to finishing cut. These typical workpieces also demonstrate ACRAMATIC's ability to mill "mirror image" parts without re-programming.

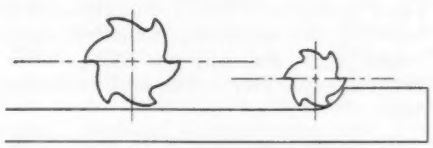
CINCINNATI Acramatic Numerical Control

Lets you change cutter diameter or depth of cut . . . without re-programming

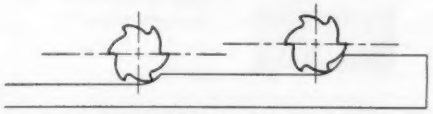
ACRAMATIC is a highly accurate numerical control system, based upon the use of precision toroidal transformers. Its relative simplicity permits a number of unique operating advantages. The Cutter Compensating Control is an outstanding example.

A contouring operation usually permits no variance from the programmed cutter size. But with CINCINNATI ACRAMATIC'S Cutter Compensation, cutting tools varying as much as 1" diam. may be employed by means of one simple dial adjustment. Machine operators thus can change or resharpen the cutter anywhere in a cut. The same dial adjustment permits both rough and finish cuts without altering the program. ACRAMATIC provides added flexibility by the fact that one program can serve for both left- and right-hand parts (mirror images).

The ACRAMATIC system offers many other cost-saving advantages. We will be glad to send you our new publication No. M-2125, which gives further information. **The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**



Exclusive Cutter Compensation feature eliminates re-programming for cutters of varying OD. Notice how centerline of the replacement cutter changes to compensate for difference in OD.



For rough and finish cuts, Cutter Compensation alters path of cutter by an amount equal to stock removal of finish cut.

MMT-PE

Booth No. 1034

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BUILDERS OF FINE MACHINE TOOLS: MILLING • GRINDING • BROACHING • ELECTRICAL DISCHARGE MACHINING • DIE SINKING • CUTTER AND TOOL GRINDING • PRODUCTION LINES • METAL FORMING • • • HARDENING MACHINES

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. . . to Motorize their stove changing valves with LimiTorque "Push-Button" Operators

LimiTorque not only saves time, money and unnecessary labor over hand operated Stove Valves, but it permits greater accuracy in controlling conditions in Blast Furnace Systems,—which in turn contributes to a better finished product; in fact, automatic operation by LimiTorque contributes to lower operating costs. Push-button changing of Stove Valves by LimiTorque gives automatic sequence operation from one position to another; requires only a fraction of the time required by hand operation,—and the job can be done by one man from any convenient location.

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How to Pick the Vender

SOME COMPANIES choose equipment venders like a college freshman picks a date on a moonlit night—purely on emotional appeal.

Others are like a bride in a bargain basement—price is the only consideration.

But the most efficient plants are managed by men who use a scientific approach in selecting a vender, STEEL found in an exhaustive study.

They recognize that the difference between the best and second best machine for any job can be measured—in dollars saved through reliability (of both machine and vender), in material saved through accuracy, in dollars lost through poor service, or late delivery, or numerous other factors that affect production efficiency.

Their theme is spelled out by E. S. Waters, manager-purchasing, General Electric Co.'s Large Steam Turbine-Generator Dept.: "In buying machine tools, we look for the one that will give us the maximum chip making capability for the least dollars of cost." But Mr. Waters quickly points out: He isn't talking about the machine that cuts the most metal per dollar of original equipment cost. If that were the case, a housewife's best tool for any cutting chore would be a machete.

What Can You Measure?

"Show me a man who says that equipment buying involves too many intangibles to be scientific and I'll show you a man whose shop lacks production efficiency," one executive told STEEL.

His implication: You can measure the important factors to consider in picking an equipment vender. Miehle Co., a division of Miehle-Goss-Dexter Inc., measured 21 in buying a jig borer. When choosing between competitive special machine tools, GE compares as many as 31 features under six headings: 1. Spindle—horsepower per revolution, feed, thread leads, traverse, spindle speeds. 2. Head—feed, traverse, over-all length and width of ways, number of ways, type and size, bull gear, diameter of quill, diameter of bearings, distance between bearings. 3. Cross column—over-all length, type, and width of ways, number of ways and size, feed, traverse. 4. Bed—over-all length, width, and type of ways, feed and type, traverse, coolant, weight, number of ways and size. 5. Accessories—small facing head,

STEEL queried 700 executives in leading metalworking companies. The subject: How to choose an equipment vender when you have several potential sources for needed equipment. Here are the results . . .

Who Picks the Equipment Vender?

This man helps pick the vender . . .	. . . in this per cent of companies
Plant superintendent	71%
Purchasing agent	50%
President	46%
Plant engineer	43%
Industrial engineer	41%
Vice president	35%
Production manager	33%
Department manager or foreman	32%
An established committee	14%
Design engineer	7%
Treasurer	4%
Chairman	2%
Others	5%

How Many Men Pick the Vender?

This many . . . . . in this % of firms	
One	2%
Two	13%
Three	26%
Four	26%
Five	12%
Six	13%
Seven	6%
More than seven	2%

Who Has Final Authority?

No one person	29%
President	25%
Vice president	16%
Plant superintendent or works manager	10%
Purchasing agent	7%
Production manager	5%
Other	8%

large facing head, spindle extension, angle head, turntable. 6. Miscellaneous—extra bed, delivery, price.

You can compare—objectively—all the factors you must consider in choosing the machine—and vender—that will give you the optimum production efficiency. And the job must be done by management—not by a clerk, the experts agree. Listen to H. Thomas Hallowell, president, Standard Pressed Steel Co., Jenkintown, Pa.: "You should give as much care to the purchase of a $14,000 machine as you would give to a $1 million order—for it can take a $1 million sale to supply the profits to buy that machine."

The experts generally agree that picking an equipment vender is no more a one-man job than is the proper rendering of a Tchaikovsky symphony—you need an organized blending of professional skills to do both, if you want cash results. STEEL's consultants advise that vender selection should be a joint endeavor of top management, production, engineering, and purchasing. At least three, and often four, five, or six executives, are directly involved in the decision (see table).

The point is made by W. J. Artner, plant manager, National Machinery Co., Tiffin, Ohio: "Each of us has favorite brands of equipment and this can sometimes be a pitfall. However, every time we're ready to buy a new machine, we check with several venders. We think it's a good idea to put much of the burden for equipment selection on the vender. He must help us find the payoff period, the rate of return, or other justification for the purchase. He must also demonstrate the validity of his claim to having the best machine for our job. Of course, we check him out."

Mr. Artner adds: "We're greatly interested in a vender's integrity. If he proves it, we give him the run of the plant. Then he gives us ideas on what we need. He talks with foremen and operators. We permit some salesmen to do that. But they must prove their technical competence first." A tip from George Kluter, works engineer, Warner & Swasey Co., Cleveland: Keep accurate maintenance records. They'll show you each brand's weak points.

Reputation Is the Key

"In selecting a vender, the first thing we consider is our experience with each of the sellers involved. When we're looking at a machine of a type we haven't used, we never hesitate to call other users of the machine and question them about it. We usually telephone because the users will talk more freely that way. And we visit other users' plants as part of our preliminary investigation." That comment by F. M. Bender, Miehle's vice president-manufacturing, points up the importance of vender reputation to the buyer of capital equipment.

In STEEL's survey, the three facets of vender reputation—the overall reputation of the equipment maker, the reputation of the vender for service and parts, and the buyer's experience—ranked as superlative considerations, garnering a whopping 47 per cent of the first place votes (see Page 47).

STEEL asked several prominent equipment buyers what ingredients formed their opinions of a vender's reputation. Typical answers:

How Is the Vender Chosen?

STEEL asked the managers surveyed to rank the factors they considered in choosing an equipment vender . . .

Rank	Factor	Over-all Weighting*
1	Price	744
2	Over-all reputation of the equipment maker	652
3	Reputation of the vender for service and parts availability	628
4	Your previous experience, if any, with equipment of same make	627
5	Accuracy of the equipment	593
6	Delivery	501
7	Foreman's preference	230
8	Salesman's technical competence	204
9	Operator's preference	131
10	Salesman's personality	83

*On the basis of 10 points for each 1 per cent of first place rankings, 9 points for each 1 per cent of second place rankings, 8 points for each third, etc. Note that the first five factors are given such extreme importance that all must be carefully analyzed.

"The length of time the vender has been in business . . . tangible evidence of his progressiveness . . . how well his products have been accepted . . . his method of handling service and giving quick delivery on repair parts . . ."—F. D. Wallace, vice president - general manager, Adams Div., LeTourneau-Westinghouse Co., Indianapolis.

How often a builder brings out new products is an important consideration in evaluating his reputation, points out E. C. Kain Jr., plant manager, Pioneer Fabricating Co., Attalla, Ala. "We select venders on the basis of their reliability," states G. G. Kearful, plant and process engineer, Saginaw Steering Gear Div. of General Motors.

"All of us have fixed ideas of who the leaders are in various equipment lines. Builders establish such reputations through giving you topnotch equipment and service in your previous dealings with them, and they maintain the reputation through advertising. I feel that reputation is synonymous with performance. We visit other users of the equipment to learn what they think of it and the vender."—A. C. Wedge, vice president-manufacturing, DeWalt Inc., Lancaster, Pa.

Some buyers keep a black list of venders who have failed them in the past. Those sellers are seldom permitted to bid on a job.

Price IS Important

The executives surveyed by STEEL rank price as the single most important factor affecting the choice of a vender. But it is often the last consideration—it assumes the "last but not least" role. Listen to Weld Morgan, vice president-operations, Morgan Construction Co., Worcester, Mass., tell why:

"We never look at the prices on competitive quotations until after we have carefully evaluated the machines and decided which one will do the best job for us. If you read the prices first, you unconsciously try to justify purchasing the cheapest one when you make the competitive analysis of features and performance. So we make the analysis, then compare prices. If the price of the machine we want is out of line, then we can re-evaluate and, perhaps, buy the second best machine. But a 10 per cent price premium may be justifiable due to greater productivity or other advantages."

R. L. Gunnell, vice president-purchases, Rapids-Standard Co. Inc., Grand Rapids, Mich., says: "If quality and delivery are alike and the machine's cost is under $1000, price becomes a prime factor in the selection of a vender when the difference between two bids is 10 per cent of the highest price; if the machine's cost is $5000 or more, price becomes a prime factor when there is a 5 per cent differential."

Conclusion: Price is always a prime factor in vender selection. The degree of its importance will vary according to other considerations that might justify paying a premium. One such consideration is mentioned by the vice president of a California firm; he told STEEL: "We just bought a $180,000 machine from a customer of ours in preference to a vender who is not a customer, but whose machine cost $10,000 less.

Accuracy Gives an Edge

Three in ten survey respondents list accuracy as the most important factor to consider in picking a vender. A. J. Kleiner, manufacturing superintendent, Hamilton Watch Co., Lancaster, Pa., puts it: "Accuracy and dependability are paramount. In precision work, price is of lesser importance."

How do you correctly measure a machine's accuracy? Answers Edson Gaylord, vice president and general manager, Ingersoll Milling Machine Co., Rockford, Ill.: "In buying multipurpose machines, one of the most important jobs is selecting the representative workpieces on which to test the machine. If your sample of parts is not truly representative of the work you plan to do on the machine, you can't properly evaluate precision, quality, and production rates."

How Many Sources?

Industry leaders are sharply split on this question: Over the long term, should you deliberately attempt to buy production equipment

C. A. WOODLEY, executive vice president, Caterpillar Tractor Co.: We buy foreign machine tools where they are competitive in price and where they serve our purpose as well as or better than domestic equipment. We buy from whatever source suits our needs best.

H. THOMAS HALLOWELL JR., president, Standard Pressed Steel Co.: You should give just as close attention to buying a $14,000 machine as you would to getting a $1 million order: It generally will take an order of that size to supply the profits you need to buy that machine

J. E. FICK, vice president—Steel & Tube Div., Timken Roller Bearing Co.: You must stay alert for every practical application of a new process in your field and get full information on it immediately. Otherwise, you may be buying equipment that will be obsoleted tomorrow

from several competing venders?

• **Only One**—Some equipment buyers try to standardize as much as possible on the brands of capital equipment to be used in their shops. Mr. Gunnele explains why: "It simplifies repair part stocking and maintenance. And it permits an operator to run any of the machines with the same degree of familiarity." But he adds that his firm will switch to another vender to take advantage of a new feature that gives it a whopping competitive edge.

Adds the president of a California firm: "As good customers to a few equipment builders, we get fast service from a phone call." Hamilton Watch's Mr. Kleiner says his firm standardizes on equipment for uniformity of design, tooling, spare parts, and maintenance.

• **Several**—Admitting that standardization offers advantages, some other buyers contend that you may be cheating yourself by not deliberately buying from several competing venders. Hear these executives tell why:

"To keep all venders alert and competitive"—J. W. Lindsey, vice president-purchases, Jones & Laughlin Steel Corp.

"To assure ourselves that we learn about all design improvements, capacities, price developments, and accuracies" — LeTourneau-Westinghouse's Mr. Wallace.

"So that venders will keep each other in line pricewise" — Ohio maker of auto parts.

"To take advantage of more than one supplier's knowledge of the particular job and type of equipment" —Midwestern purchasing agent.

"To protect ourselves in emergency buying situations"—executive of a Big Three auto company.

It's Worth the Effort

You can easily spend $500 worth of time to analyze the proposal for a $10,000 machine, points out W. W. Kuyper, manager-manufacturing engineering, GE's Large Steam Turbine-Generator Dept. "How you make out depends a great deal on what you do before judgment is passed on the final proposal . . . you need men who will champion the proposals they deem vital to the company's welfare," Mr. Kuyper summarizes.

Production Efficiency

How to Sell It to Labor

On June 6, STEEL will show how to sell the concept of production efficiency to the production worker. For a free copy of any or all articles in this Program for Management (running every other week since Jan. 11), write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. By using material like this, you may win $1000. See Pages 5 and 6 for details.

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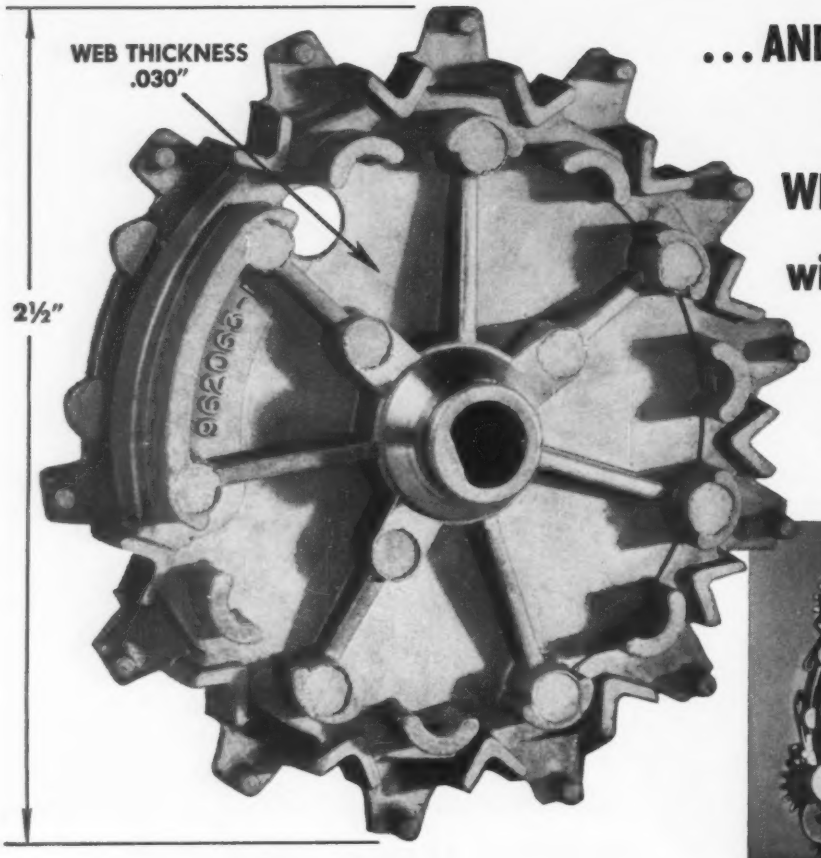

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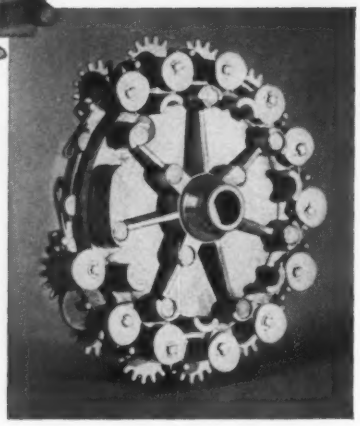

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- NOTHING TO WORK LOOSE — TROUBLE-FREE OPERATION
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Precision engineered for RCA Victor television receivers, this complex, one-piece ZINC die casting is quickly assembled with gears and cams for locking each channel in fine-tuned position.

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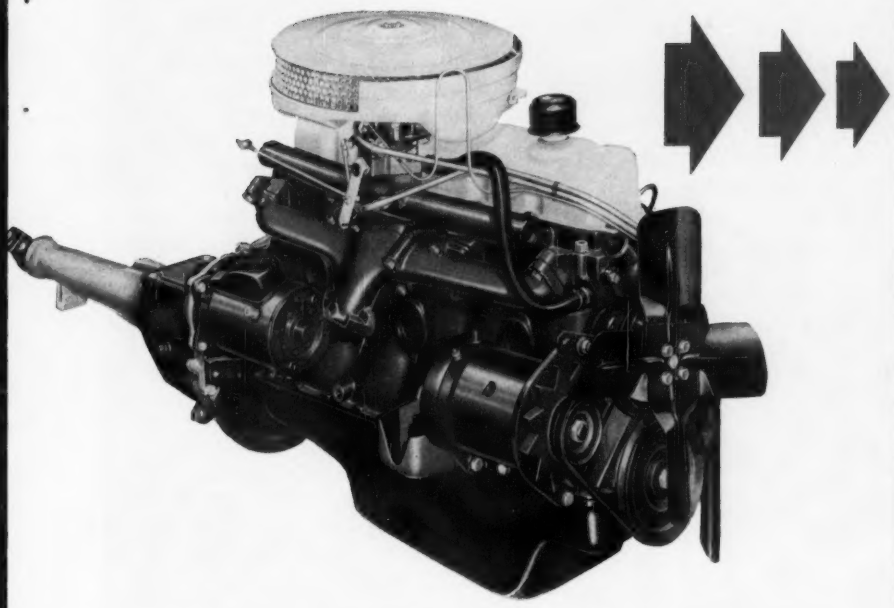

FALCON MATERIALS

ALUMINUM

Water Outlets, Oil Pump, Carburetor Spacer, Distributor Housing, Generator End Plates, Flywheel Housing, Rocker Arm Supports

STEEL

Sprockets, Timing Chain, Push Rods, Front Cover*, Rocker Covers, Oil Pan

IRON ALLOYS

Camshaft, Crankshaft, Flywheel, Tappets, Pulleys, Block

ZINC

Carburetor, Fuel Pump

*Optional in aluminum.

Ford Tells How It Trimmed Costs on Falcon Engine

FORD MOTOR CO. is the only Detroit based automaker that has not leaped on the "all aluminum" bandwagon. It has several engines with aluminum blocks under test. Obviously, it can produce one if it wants to, but so far the company sees no reason to move to the lighter, but more expensive, metal. Ford uses aluminum for many engine components where its lightness and manufacturing simplicity mean cost advantages, but blocks continue to be gray iron.

Says Emmett J. Horton, manager, advanced engine engineering: "We'll go to aluminum just as soon as we see that it will give us equal efficiency at less cost. So far this hasn't happened."

• **Take Heed**—The big pitch of aluminum's proponents has been to design for final piece price. They say: Even though the raw material costs more, aluminum can be designed for simplified manufacturing and finishing operations, so final unit costs will be equal to or lower than the same parts made of steel, cast iron, or other metals.

Ford likes the theory. It says: "We'll use the same approach on other metals that may weigh more. By careful design we can eliminate extra weight, simplify manufacturing, and wind up with engines that are just as efficient and almost as light. And we'll still be able to take advantage of the lower cost materials."

• **Example**—The Falcon engine is Ford's first try. The material list (above) shows where the company found each metal most advantageous. Mr. Horton says his group was able to cut weight and costs because it had a free rein on methods and design so long as the finished engine met the target weight set up by production planning. "By including foundry and tooling men in our design project from the beginning, we made changes that manufacturing people said couldn't be done," he asserts. His group beat the engine's target weight (360 lb) by 8 lb.

Ford plans to redesign its conventional powerplants. It's also working with a gray iron block for the engine of a light-light car expected to be introduced for the 1962 model season. The engine

FALCON ENGINE SPECIFICATIONS

TYPE	OHV
BORE	3.50
STROKE	2.50
DISPLACEMENT	144.3
COMPRESSION RATIO	8.7/1
MAX. BHP	90/4200 RPM
MAX. TORQUE	138/2000 RPM
BHP/CU. IN.	624
TORQUE/CU. IN.	956
TOTAL ENGINE WEIGHT	352.81 lb

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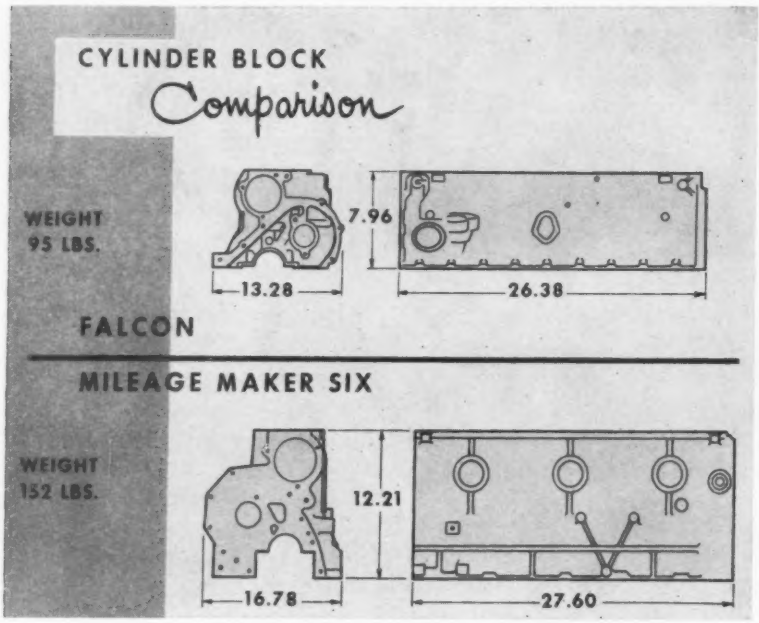


and power train are supposedly being tooled in Germany.

Falcon's Engine Design

Mr. Horton has explained the design features of Falcon's engine to the Society of Automotive Engineers. Here's a rundown from his SAE report on how and where Ford designed out weight and costs.

• **Block**—"Falcon blocks are cast two at a time in one green sand mold," reports Mr. Horton. A total of nine cores, five of which are shell type, are needed for this operation. By casting the blocks with opposite ends together, Ford has made more cost savings by using interchangeable crankcase and barrel cores at either end of the mold. Water jacket, tappet chamber, and end cores are also interchangeable.

To prevent bore distortion, the cylinder head bolt bosses do not tie into the bore walls but are blended into the outer walls. Cylinder bores are attached only at the top and bottom decks and are completely surrounded by water over their entire length. Additional cost and weight savings are realized because Ford has designed the block so compactly that it's rigid enough without the use of a long skirt. Adds Mr. Horton: "Self-damping qualities of cast gray iron, along with its high degree of wear resistance, assure quiet operation and durability."

• **Head and Manifold**—One of the unique features of the Falcon engine is its integrally cast head and intake manifold. The two pieces are usually cast separately and bolted together. The integral design eliminates a dozen or more bolts and a gasket. It also eliminates drilling and tapping operations for the bolt holes.

The top machined rail on the head is designed so the rocker arm cover can be mounted with rim hold-down bolts. The approach eliminates the possibility of oil leaks in that area.

Another cost savings area shows up in the design of the main runner in the manifold. Both ends of the runner are left open so cores can be pulled easily. The openings are sealed with cup plugs. The design also permits better air fuel distribution to each cylinder because the intake system is laid out to provide individual ports to each combustion chamber. Small dams are cast in the runner to aid in obtaining the optimum air fuel distribution to each cylinder over a wide engine speed range, explains Mr. Horton.

• **Crankshaft** — The crankshaft is shell molded from pearlitic malleable iron. Instead of a conventional crankshaft design, Ford engineers provided what looks like an oversize journal overlap of 15/16 in. It gives extra rigidity without adding weight. The rear flange of the crankshaft was designed so the over-all engine length could be shortened by 5/8 to 3/4 in.

• **Other Savings** — To eliminate carburetor icing, Ford started with a diecast aluminum carburetor spacer. It has an integral water passage tangent to the bore and is connected in series with the inlet water supply to the constant flow heater core. The flow of heated coolant is continuous through the spacer.

The starter has been designed so the drive pinion meshes with the flywheel ring gear from the front.

Are You a Good Guesser?

Check the Servicenter, Page 5, for a coupon to enter in STEEL's Beat-the-Experts contest. You might win free use of any Ford Div. car for two weeks, or become the owner of a handsome color print of a dream car.

U. S. Auto Output

Passenger Only	1960	1959
January	688,731	545,757
February	659,323	478,484
March	654,242	576,085
April	582,909	578 825
4 Mo. Totals	2,585,205	2,179,151
May		546,817
June		557,994
July		555,418
August		239,152
September		258,157
October		507,530
November		254,527
December		494,931
Total		5,593,677
Week Ended	**1960**	**1959**
Apr. 23	144 886	133,987
Apr. 30	135,515	118,059
May 7	142,091	134,763
May 14	145,917	135,856
May 21	155,153†	133,568
May 28	142,000*	117,372

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

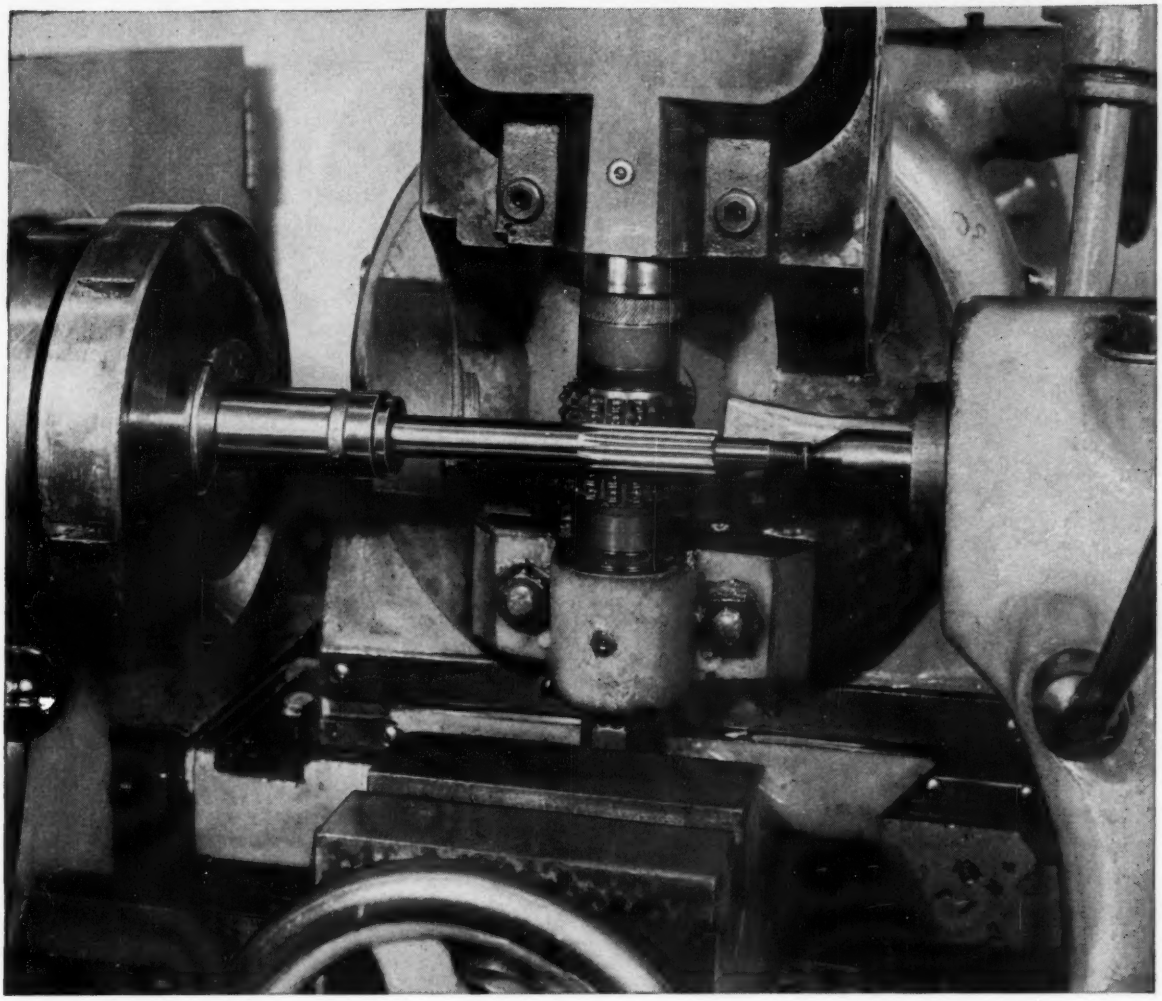
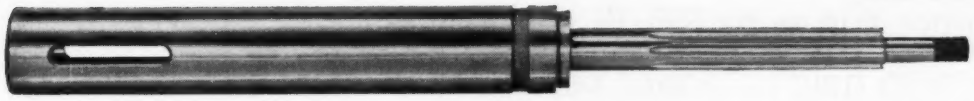


Photo courtesy Greenlee Bros. & Co.



Aristoloy Leaded Doubles Tool Life... Increases Feed 70% for Greenlee

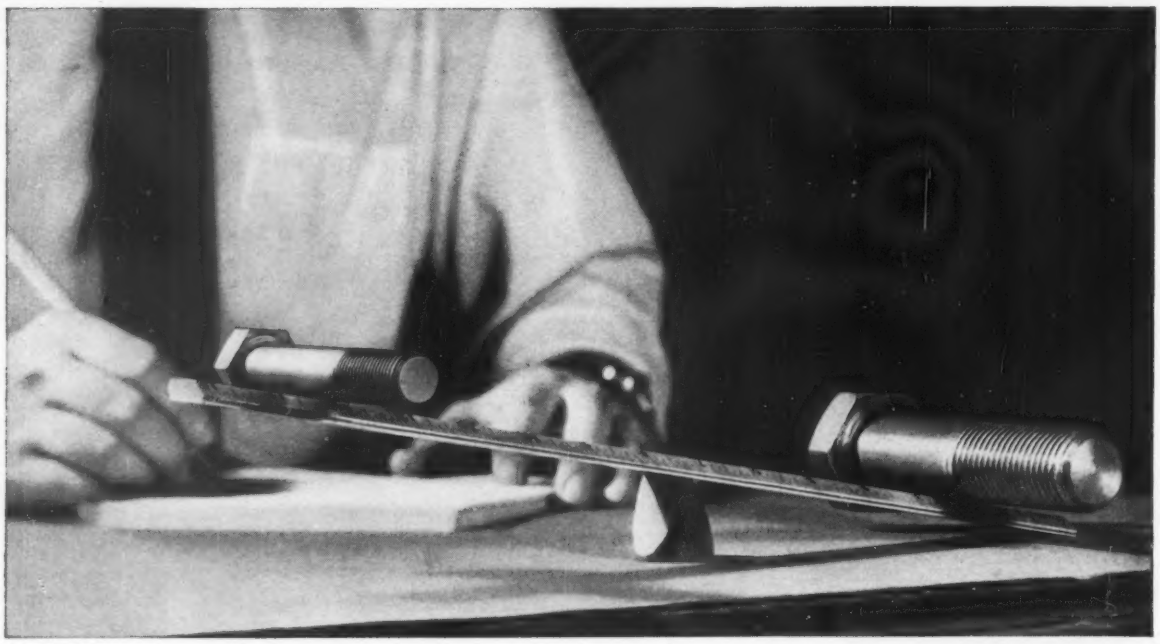
ARISTOLOY STEELS

Two divisions of Greenlee Bros. & Co. switched to Aristoloy 4150 leaded. Faster machining—feeds and speeds boosted 60 to 70%—and improved surface finish were realized by the Machine Division on gears, spindles and shafts. Similar benefits were realized by the machine tool maker's Tool Division on machine bits, hydraulic rams, pistons and cylinders. Tool life was upped 200%, drastically reducing tool costs and eliminating hours of down-time for changes.

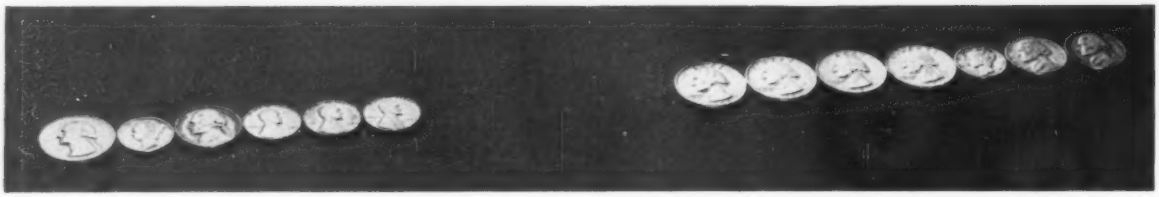
For complete information about free-machining Aristoloy leaded steels, call the Copperweld representative in your nearest large city. Write for booklet, "A Complete Line of Leaded Steels," or information on standard carbon, alloy and stainless grades.

COPPERWELD STEEL COMPANY

ARISTOLOY STEEL DIVISION • 4005 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.



Weighs a 64% cost reduction



Fastener survey by RB&W seeks to deliver maximum holding power per fastener-dollar ... makes possible substantial savings

Since the job of a standard fastener is mainly to hold an assembly together, its *"clamping force"* is what you really want. You can reduce costs by applying this fact and buying fasteners by their *holding power* rather than size.

For example, compare SAE "proof load" and cost ratios of four different hex screws of standard steels.

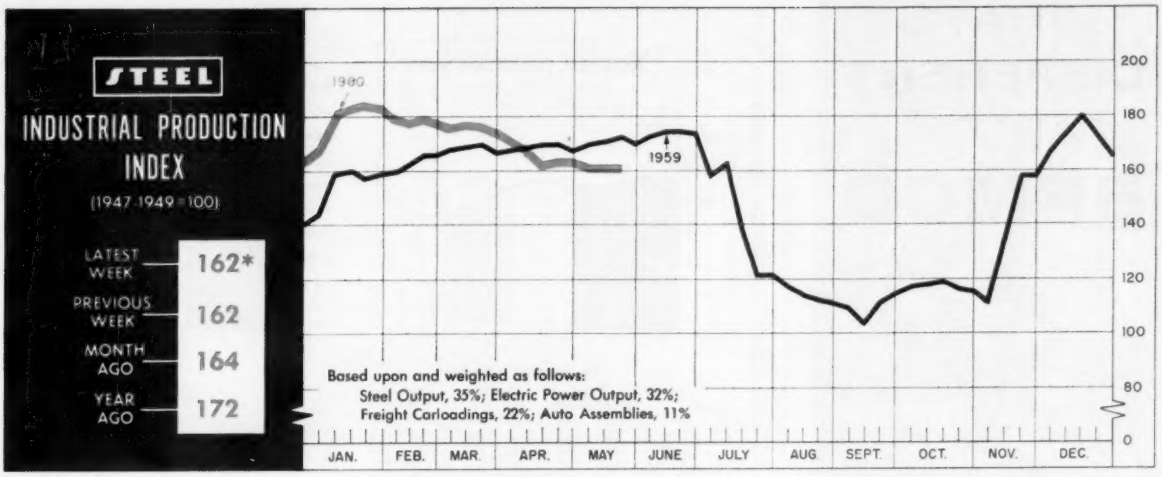
Grade	SAE Grade 5	SAE Grade 2	SAE Grade 2	SAE Grade 2
Size	¾ x 5"	1 x 5"	1⅛ x 5"	1¼ x 5"
Proof load (lbs)	28,400	16,950	21,350	27,100
Cost Ratio	100%	100%	239%	277%

Almost unbelievable. The smallest—the heat treated RB&W High Strength Hex Screw—exceeds all the others in load capacity, can usually be used instead of any of them. But, since it's smallest and weighs less, it also costs you less. 64% less than the 1¼" Grade 2 screw; 58% less than the 1⅛", etc. And because holes can be made smaller, you save on production, too.

Want to get the most from *your* fastener dollars? Let a specialist who best knows the subject of fasteners contribute his knowledge to that of your engineers. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

R B&W
115th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. Sales agents at: Cleveland, Milwaukee; New Orleans; Denver, Fargo. Distributors from coast to coast.



*Week ended May 21.

Potential Remains High for '60s

ALTHOUGH the soaring sixties are off to a slower start than many anticipated, there is plenty of reason to think that "there is gold in the far-off hills of 1970," declares Martin R. Gainsbrugh, chief economist of the National Industrial Conference Board.

Here are some possibilities: If the trend of the gross national product over the past 50 years is projected, GNP in another ten years will be at least $624 billion—or $124 billion higher than the current annual rate. If the trend of the last 30 years is extended, the nation's output could be $806 billion. In between is the trend of the postwar years, extending out to $724 billion by 1970.

• **Combination of Forces** — Mr. Gainsbrugh points out that by combining certain other assumptions, the variations in projected national output in 1970 can vary from $665 billion up to $860 billion. The upper limit assumes a continuation of the postwar rate of increase in output per manhour, a continuation of the present length of the workweek, the highest estimate of the labor force made by the Bureau of the Census, and unemployment of 3 per cent. The lowest projection assumes a rise in output per hour at the long term rate, a decline in the workweek at its postwar rate, the lowest of the Census Bureau's work force estimates, and a 5 per cent unemployment rate.

• **Productivity Utmost**—The biggest factor is productivity. Changes in the employment rates alter the ultimate total only 2 per cent, and variations in the workweek affect the outcome by 7 per cent. But a change in productivity between the two trends yields a difference of 16 per cent in the final GNP for 1970. (See "Metalworking Week," Pages 25-28 for more details.)

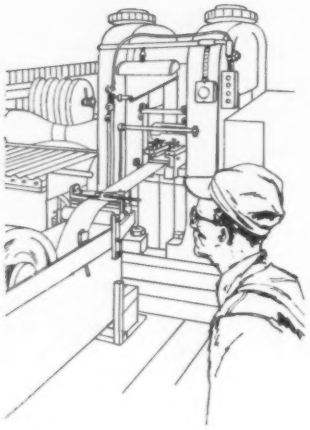
• **Population Boom**—"The level of economic well-being in the sixties

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,906[1]	2,031	2,650
Electric Power Distributed (million kw-hr)	13,400[1]	13,350	12,931
Bituminous Coal Output (1000 tons)	8,200[1]	8,275	8,345
Crude Oil Production (daily avg—1000 bbl)	6,775[1]	6,794	7,216
Construction Volume (*ENR*—millions)	$498 0	$385.8	$470.8
Auto, Truck Output, U. S., Canada (*Ward's*)	195,135[1]	182,029	169,551
TRADE			
Freight Carloadings (1000 Cars)	640[1]	640	686
Intercity Truck Tonnage (changes from year ago)	−3.6%	−2.0%	+18.2%
Business Failures (Dun & Bradstreet)	304	327	311
Currency in Circulation (millions)[3]	$31,774	$31,723	$31,515
Dept. Store Sales (changes from year ago)[3]	−2%	−1%	+9%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$28,408	$24,572	$26,546
Federal Gross Debt (billions)	$288.1	$288.6	$285.3
Bond Volume, NYSE (millions)	$32.4	$26.1	$26.1
Stocks Sales, NYSE (thousands of shares)	19,725	15,421	15,970
Loans and Investments (billions)[4]	$102.7	$103.0	$103.2
U. S. Govt. Obligations Held (billions)[4]	$25.7	$25.9	$32.3
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230.8	230.9	221.7
All Commodities[7]	119 8	119.9	119.6
Commodities Other than Farm & Foods[7]	128.4	128.4	128.0

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

WHAT'S
DIFFERENT
ABOUT
BRMCO



BRMCO BRONZE, an alternate for phosphor bronze with similar characteristics, is a cold workable alloy noted for its toughness, ductility, uniform quality, high tensile strength, and high electrical and thermal conductivity.

BRMCO developed this special high quality, inexpensive copper base alloy with a leading electrical manufacturer, and has supplied it to many major electrical and electronic manufacturers.

BRMCO BRONZE is also used where spring quality, corrosive resistance, strength and uniformity are prime considerations—for fuse clips, hardware items, springs, plating racks, blade switches, electrical contacts, outlets, circuit breakers and others.

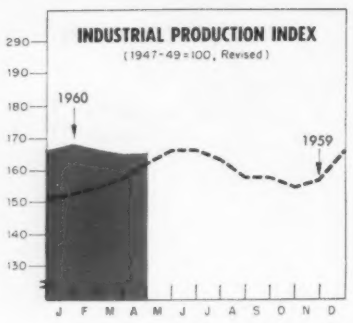
For better products and lower metal working costs, try BRMCO BRONZE.

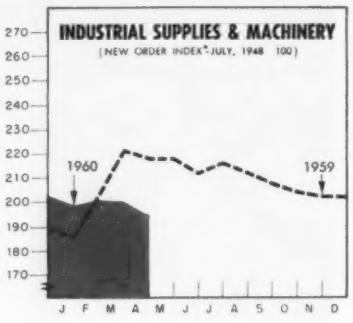
We'll be happy to send you samples for your own testing and analysis. Simply write, or call collect.

BRMCO

Bridgeport Rolling Mills Company
BRIDGEPORT, CONNECTICUT
Subsidiary of Atlantic Coast Industries, Inc.
FINE QUALITY ALUMINUM, BRASS AND BRONZE IN STRIP AND ROLLS

THE BUSINESS TREND





(Seasonally adjusted)

	Total Production		Total Mfg.		Durables Mfg.	
	1960	1959	1960	1959	1960	1959
Jan.	168	152	168	150	181	156
Feb.	166	155	166	153	178	160
Mar.	165	157	164	156	175	165
Apr.	165°	162	164°	161	173°	170
May	...	166	...	165	...	177
June	...	166	...	166	...	178
July	...	163	...	163	...	171
Aug.	...	157	...	156	...	158
Sept.	...	157	...	156	...	157
Oct.	...	154	...	153	...	155
Nov.	...	155	...	154	...	155
Dec.	...	165	...	164	...	174
Avg	...	159	...	158	...	164

Federal Reserve Board. °Preliminary.
Charts copyright, 1960, STEEL.

	1960	1959	1958	1957
Jan.	198	186	163	221
Feb.	200	202	157	219
Mar.	199	221	149	210
Apr.	194	218	148	203
May	...	218	152	199
June	...	212	164	199
July	...	216	170	197
Aug.	...	212	172	197
Sept.	...	207	178	203
Oct.	...	204	187	192
Nov.	...	202	189	180
Dec.	...	202	190	167

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.

will be an important influence on the birth rate, and hence on the rate of population growth," the economist declares. "Conversely, the rate of population growth will doutless influence demands for a broad range of goods and services." The groundwork already has been laid for a significant growth in family formations (the rising trend of postwar births), but the variations in the forecasts for this decade will be centered in the age groups below the age of ten. "The working age, marrying age, and buying age population of the sixties is already born."

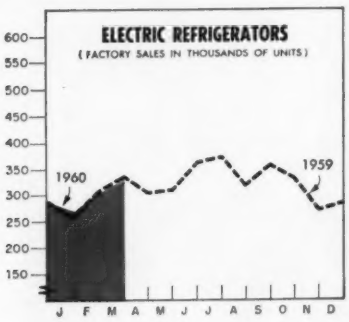
Thus the work force may rise as much as 13.5 million in the next ten years compared with a growth of less than 9 million in the fifties. And the emphasis will be on the male sector, which will rise more than twice as fast in the last half of the 1960s as it did in the corresponding portion of the last decade.

The high birth rate of the last 15 years also suggests a high rate of family formations as the new decade rolls on. Estimates range from a total of 59 million to 63 million families by 1970 compared with about 51 million last year. The rising number of marriages foreseen—at least 50 per cent higher annually by 1960 than at present—tends to favor the upper limit on household formations.

If the projections hold, and the highest birth rate projection is achieved, population by 1970 could total 220 million, about 40 million above today's figure. If the birth rate falls off to the lowest rate projected by the Census Bureau, population will still be 205 million.

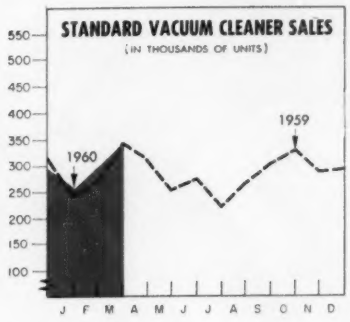
• **Training Trend**—Not only will the labor force of the sixties be larger and younger, but it will also be better educated. Mr. Gainsbrugh says that the labor force is being "restructured" in the direction of higher skills, implying a "rising level of educational attainment on the part of new entrants . . . the number who have completed high school will be almost 60 per cent greater; the number with some high school will be one-third greater; and the number with no high school education at all will be one-third fewer."

• **$300 Billion More**—If certain relatively optimistic assumptions are made (and Mr. Gainsbrugh points out that most forecasters are making them), these growth patterns could yield a GNP of $769 billion



	1960	1959	1958
Jan.	266,700	256,200	206,100
Feb.	302,400	306,200	227,800
Mar.	338,100	333,700	261,100
Apr.	.....	301,000	210,800
May	.....	308,200	262,900
June	.....	361,000	316,300
July	.....	370,800	279,700
Aug.	.....	314,100	245,900
Sept.	.....	355,700	295,200
Oct.	.....	329,600	277,500
Nov.	.....	265,900	245,500
Dec.	.....	282,600	286,900
Totals	.....	3,785,000	3,116,700

National Electrical Mfrs. Assn.



	1960	1959	1958
Jan.	258,330	242,516	265,489
Feb.	294,483	271,396	225,631
Mar.	339,918	346,557	291,418
Apr.	.....	317,402	247,293
May	.....	257,345	218,766
June	.....	275,974	253,127
July	.....	221,232	263,778
Aug.	.....	268,465	280,226
Sept.	.....	305,096	299,618
Oct.	.....	330,899	339,127
Nov.	.....	290,130	293,609
Dec.	.....	293,818	316,965
Totals	.....	3,420,830	3,295,047

Vacuum Cleaners Mfrs.' Assn.

(in 1959 dollars) for 1970, or an increase of about $300 billion over the current level.

If the 1970 pie is cut along the same lines as it was in 1959 ("the major sectors of the American economy change only slowly"), the indicated increase for personal consumption ($206 billion) is equal to the total of all consumer outlays in 1946; the increase in demand for producers durables ($44 billion) is roughly the equivalent of the addition of an entire industry the size of the present automobile industry; the combined increase in construction demand ($37 billion) is considerably larger than the present residential building industry."

• **Rough Spots**—The NICB economist stresses that these are not forecasts. They are projections based on historical patterns and stated assumptions. And he declares that the path ahead may be bumpy, just as it was in the past.

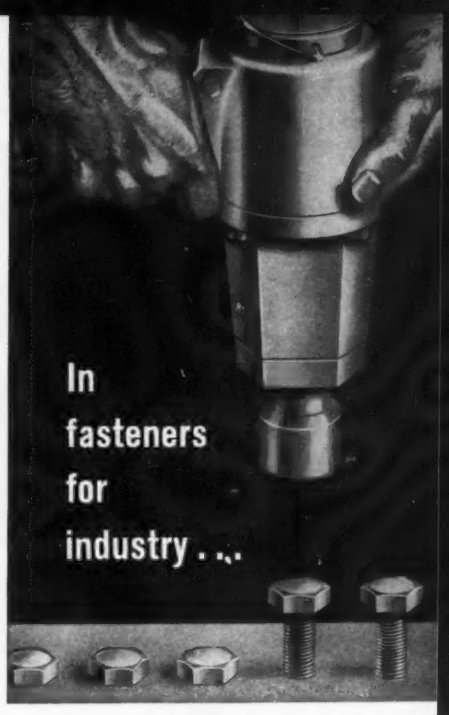
First Bump Already Here

One of the bumps has already appeared in STEEL's industrial production index on Page 55. The cause: An inventory adjustment in consumers' stocks of steel.

During the latest period, the output of steel for castings and ingots has dropped below the 2-million-ton-a-week level for the first time (except for strike and holiday periods) since early December, 1958. And many observers have stopped guessing how low it will go before consumers decide they have cut their stocks far enough—or too far.

But the other components of the index indicate that the general economy is in pretty good shape. The output of electricity is responding about as it should to seasonal influences. While occasional streaks of unseasonably cool weather may alter the pattern temporarily, the general trend will be up until the peak is reached in August. And railroad freight carloadings are holding their ground at about 640,000 cars a week despite the lack of support from the steel, coke, and coal industries. Auto production is climbing strongly in response to heavy demand for new cars.

The trend line probably will begin the Memorial Day decline in the week ended May 28, taking the full cut during the following week. But it should come back to the current level in early June.



it's dependability that counts !

Yes, *life* often rests on the dependability of the fastener.

Whether for bridges, pressure piping, skyscrapers, railroads, transformers or tunnels . . . or even your personal car, it's the *dependability of the fastener* that counts. The fastener must be *stronger . . . more dependable* than the part.

When you visit our manufacturing facilities and control laboratories, you will see for yourself how we build dependability into our IMPACT-FORM'D nuts, bolts and screws.

IMPACT-FORM'D Screw and Bolt fasteners are produced to customer demand every day:

- free—or interference-fit rail bolts
- high strength heat treated bolts for heavy construction
- close tolerance components for machinery
- screws for electronic equipment and accessories

Whether you follow industry standards or have your own specifications, IMPACT-FORM'D Screw and Bolt fasteners have the *dependability* you need.

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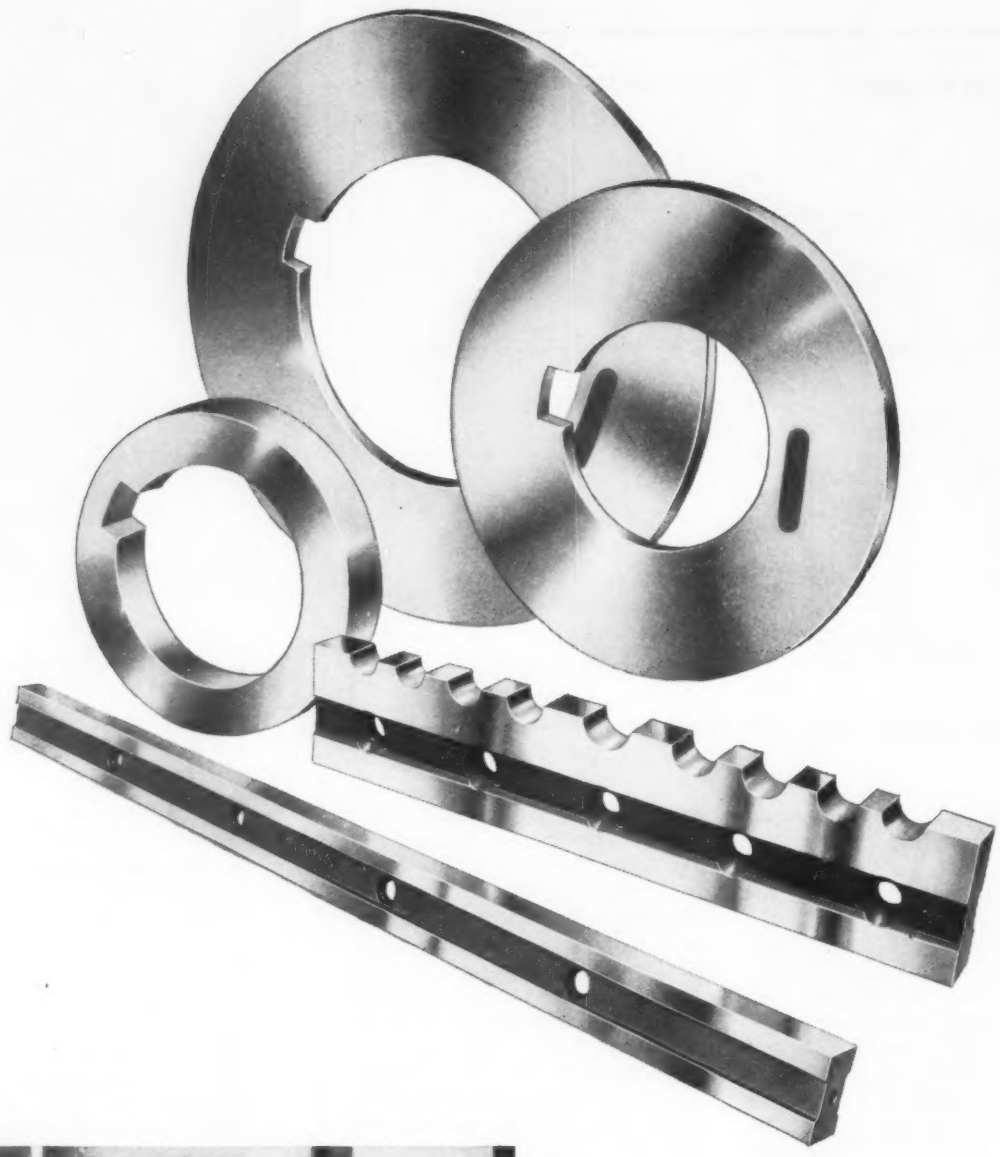
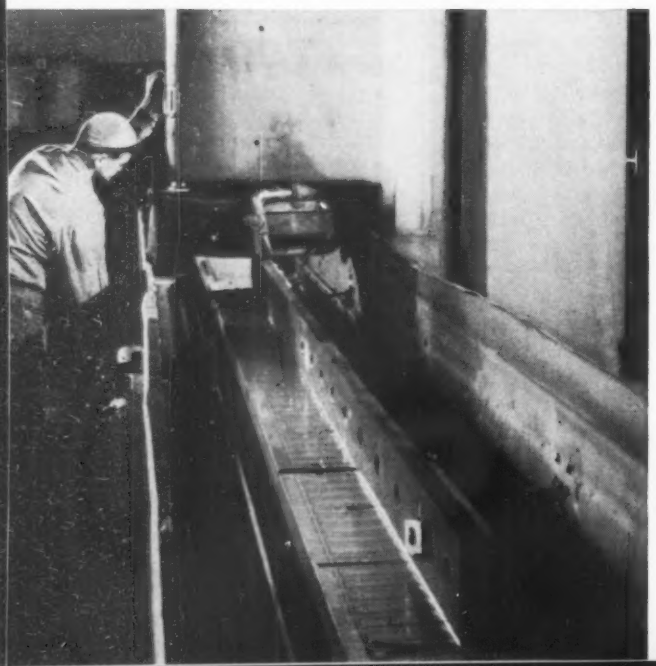
America's Most Complete Line of Industrial Fasteners





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A knife is only as good as the steel that's in it. Exact heat treatment by Heppenstall metallurgists assures users long, trouble-free service.

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PLANTS: Pittsburgh, Pa. • Bridgeport, Conn.
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MIDVALE-HEPPENSTALL COMPANY
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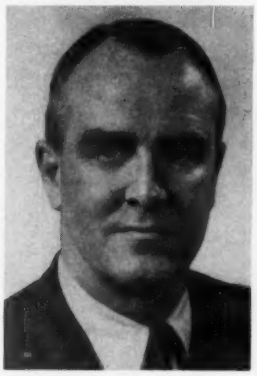
Vacuum and Consumable Electrode Melted Steels

CHARLES G. TOURNAY
Weirton Steel president



WILLIAM C. HEARD
Capewell v. p.-sales

H. S. HARRISON
Cleveland-Cliffs president

HENRY J. BRUCK
LeBlond Machine sales post

Charles G. Tournay advances from assistant to the president of National Steel Corp., Pittsburgh, to president and chief executive officer of the division, **Weirton Steel Co.**, Weirton, W. Va. Former president, **Albert J. Berdis**, becomes Weirton chairman to succeed **Edwin O. Burgham**, retired, and continuing as a consultant.

William C. Heard was elected vice president-sales, **Capewell Mfg. Co.**, Hartford, Conn. He will continue direction of Capewell's national sales engineering staff.

James W. Hawthorne was promoted to vice president and appointed general manager, **Haydon Div.**, Torrington, Conn., General Time Corp.

Cooper Alloy Corp., Hillside, N. J., appointed **Gerald Lewis** director of product development. He has been director of product engineering. He now co-ordinates sales and engineering groups in product development.

T. E. Kramer was named vice president of foundry operations for **Ross Pattern & Foundry Development Co. Inc.**, Sidney, Ohio. He was with Acme Precision Products Inc.

William E. Sehn fills the new post of director of reliability for **Fisher Body Div.**, General Motors Corp., Detroit.

William A. Damerel was appointed director of purchases for **Package Machinery Co.**, East Longmeadow, Mass. He was with Whitney Chain Co.

Cleveland-Cliffs Iron Co., Cleveland, elected **H. S. Harrison** president, and re-elected **W. A. Sterling** chairman and chief executive officer. Mr. Harrison was executive vice president. Mr. Sterling was elected president in 1953 and chairman and president in 1958.

Earl S. Goodwin was appointed director of corporate purchases for **Westinghouse Electric Corp.**, Pittsburgh. He was manager-Operations Dept. at the Bettis Atomic Power Laboratory. **H. W. Rainey Jr.** was made marketing manager of the Sturtevant Div., Hyde Park, Mass. He was general sales manager.

B. D. Claffey, vice president of **Dayton Malleable Iron Co.**, Dayton, Ohio, was made general director of Ohio Malleable Div. in Columbus, Ohio, and the GHR Foundry Div. in Dayton.

Albert R. Pfeltz Jr. was made sales manager, Pittsburgh district, **United States Steel Corp.** He succeeds the late **Joseph G. Armstrong.**

Karl C. Houston was made manager of steel sales for **Federal Steel Corp.**, Dayton, Ohio.

James R. Corcoran Jr. joined the Ogden, Utah, Div. of **Marquardt Corp.** as assistant to the vice president. He was president and treasurer of Topic Inc., electronics firm of Natick, Mass.

Alexander W. McPherson was made product development engineer, **Detroit Stamping Co.**, Detroit.

Henry J. Bruck was appointed manager of crankshaft and boring lathe sales for **R. K. LeBlond Machine Tool Co.**, Cincinnati.

Dan J. Cantillon was elected vice president-industrial sales by **Ferry Cap & Set Screw Co.**, Cleveland. Vice President **William H. North** was named general sales manager.

Albert Belge was made manager of manufacturing engineering for the Burlington, Iowa, Div. of **International Resistance Co.** He formerly supervised production engineering for Firewel Div., Aro Equipment Corp.

William R. Smart was appointed marketing manager of **General Electric Co.'s** Transformer Dept. in Pittsfield, Mass. He succeeds **James L. Elrod** who becomes manufacturing programing manager in the department.

H. P. Mueller Jr. was elected president and general manager, **Mueller Climatrol Div.**, Milwaukee, Worthington Corp. He succeeds his father, **H. P. Mueller Sr.**, retired.

Thomas A. Claiborne was elected vice president, **Tenn-Tex Alloy & Chemical Corp.**, Houston. He continues in charge of metallurgical sales in the Southwest for Tenn-Tex and its parent company, Tennessee Products & Chemical Corp.

Dr. Cloyd A. Snavely joined **Sifco Metachemical Inc.**, Cleveland, as general manager. The firm is a subsidiary of Steel Improvement & Forge Co. and holds North Ameri-

ARTHUR T. SAFFORD
Olin Mathieson marketing

RUSS A. HENKE
joins Racine Hydraulics

WILLIAM H. SPENCE
Brown & Sharpe v. p.

ROLAND H. WILSON
Riverside-Alloy works mgr.

can rights to several European processes in the electroplating field.

Arthur T. Safford was named to the new post of director of marketing for **Olin Mathieson Chemical Corp.**, New York. He was division vice president for marketing, Packaging Div.

Russ A. Henke, a consulting engineer in Wisconsin, was appointed director of research by **Racine Hydraulics & Machinery Inc.**, Racine, Wis. **Robert E. Raymond**, formerly in charge of research, plans to operate an independent consulting business at Zanesville, Ohio, where Racine's Simplex Engineering Div. is located. He will continue as an adviser to Racine Hydraulics.

Charles R. Lewis was appointed manager of sales at **Sparton Corp.**, Jackson, Mich. He was general sales manager, Liquid Carbonic Div., General Dynamics Corp., in Chicago.

George E. Tubb was named director of marketing at **Electro-Tec Corp.**, South Hackensack, N. J.

Studebaker-Packard Corp., South Bend, Ind., elected four vice presidents: **Eugene J. Hardig**, chief engineer; **Clifford W. MacMillan**, director-industrial relations; **John Soelch**, director of purchases; and **Arthur D. Whitmer**, general manufacturing manager.

Allis-Chalmers Mfg. Co. appointed to its West Allis, Wis., Works Industries Group: **A. D. Foote**, manager of materials; **R. L. Carlstein**, manager of manufacturing engineering; and **M. W. Schaefer**, assistant manager of materials.

Willard H. Spence was elected vice president-general manager, Industrial Products Div., **Brown & Sharpe Mfg. Co.**, Providence, R. I. He continues for the present as managing director of Brown & Sharpe Ltd., subsidiary in Plymouth, England.

E. J. Cloutier was made sales manager, **Wettlaufer Body Engineering Div.**, Pioneer Engineering & Mfg. Co., Detroit.

D. J. Bracken was made general manufacturing manager, **Ford Div.**, Ford Motor Co., Dearborn, Mich. He succeeds **Ward A. Folsom**, retiring June 1.

Donald W. Cook was made director of the Transducer Div. of **Consolidated Electrodynamics Corp.**, Pasadena, Calif., subsidiary of Bell & Howell Co.

Frank B. Graper was made assistant general manager and **Frank A. Saltzgiver** as manager of operations and distributor sales for Standard Equipment Div., **Dana Corp.**, Toledo, Ohio.

Simon R. Wagler was made corporate marketing manager, **American Bosch Arma Corp.**, Hempstead, N. Y.

Thomas E. Murphy was made assistant manager, tool steel sales, in the Reading, Pa., office of **Carpenter Steel Co.**

William F. Christopher was made director of marketing for **Hooker Chemical Corp.**, New York, a new post. He was manager of market development in General Electric Co.'s Chemical & Metallurgical Div., Pittsfield, Mass.

Roland H. Wilson was appointed works manager at the Riverside, N. J., plant of **Riverside-Alloy Metal Div.**, H. K. Porter Company Inc. He was assistant works manager. **Donald J. Reilly** joined the division's Sales Dept., working in the Philadelphia area.

Bernard W. Bernstrom, former chief mechanical engineer for Pickands, Mather & Co., joined **Jones & Laughlin Steel Corp.'s** Engineering Dept., Raw Materials Div., Pittsburgh.

Richard K. Teske was named Chicago district manager, **Leschen Wire Rope Div.**, H. K. Porter Company Inc.

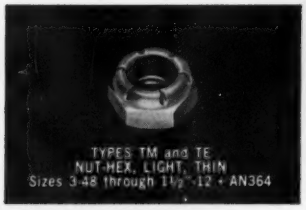
Donald F. Davern was named project manager, Industrial Control Systems, **Hughes Aircraft Co.**, Los Angeles. He was manager of planning at the Hughes Tucson, Ariz., missile manufacturing plant.

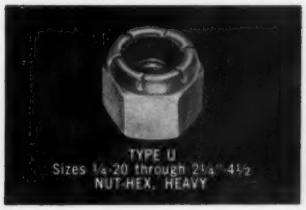
Myron D. Oakes was made manager, Product Development Section, within the Engineering Dept. of **Byron Jackson Pumps Inc.**, Los Angeles. He was chief engineer at the Lawrenceburg, Ind., plant of Byron Jackson, subsidiary of Borg-Warner Corp.

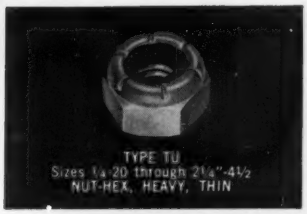
Anaconda Aluminum Co., Louisville, appointed **Nathan G. Everett** plant manager of its Terre Haute, Ind., aluminum sheet and extrusion plant. He was manager of the Louisville foil and sheet rolling plant, and is succeeded by **John M. Shepherd.**

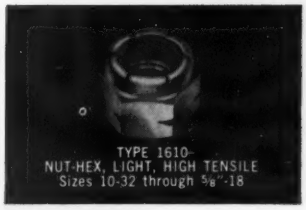
Edward F. Hirsch joined **Techalloy Co. Inc.**, Rahns, Pa., as district sales manager in New York, Northern

How does ESNA's complete line turn your special hex nut requirements into standard parts?









The answer is: by manufacturing a complete line of hex nuts—that includes hundreds of dimensional, material and tensile variations.

For example, all the nuts shown here are standard parts. Yet they range in size from a sub-miniature 0-80 thread that is only .107" across the flats to a 4"-4 thread 6-1/8" across. Thread series include SAE, USS and British BSF, BA and Whitworth series. Most are available in carbon steel, stainless, brass and aluminum. They do not gall or seize bolt threads, and they can be re-used many, many times.

Furthermore, the effectiveness of their red locking collars has been proved by more than thirty years of rugged field service—on locomotives, pile drivers, oil drilling machinery, washing machines, trucks and tractors.

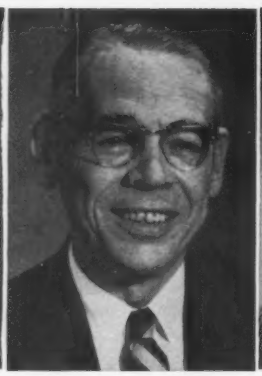
These standard ESNA hex nuts are available from stock or are produced under normal lead times. And, of course, hundreds of other "specials" are also available. For details on the Elastic Stop® nuts shown here, write Dept. **N43-560.**

ELASTIC STOP NUT CORPORATION OF AMERICA

2330 Vauxhall Road

Union, New Jersey

THOMAS W. LAWLESS
Weaver Mfg. purchasing



CLAUDE W. CAMPBELL
Acme Steel indus. eng. dir.

ROBERT B. RYAN
McLaughlin Co. president

J. EDWARD BAXTER
National Alloy sales

ALBERT W. CHAPPLE
Keuffel & Esser post

ROBERT C. FRIEDLY
Gregory Industries sales

New Jersey, and New England states.

J. Edward Baxter was appointed manager of steel plant sales for **National Alloy Div.**, Blaw-Knox Co., Pittsburgh. A sales engineer with the division for the last six years, he previously was with Jones & Laughlin Steel Corp.

Albert W. Chapple was made marketing manager of Optics & Metrology Div., **Keuffel & Esser Co.**, Hoboken, N. J. He was manager of marketing research at Perkin-Elmer Corp.

Climax Molybdenum Co., division of American Metal Climax Inc., named **Donald F. Rundle** manager, metallurgical development, at its Chicago field office. He was managing engineer of Chrysler Corp.'s Metallurgical Research Dept.

Saul D. Wills joined **REF Mfg. Corp.**, Mineola, N. Y., as project engineer. He was assistant chief engineer at Greer Hydraulics Inc.

Robert C. Friedly was made general sales manager for products at **Gregory Industries Inc.**, Lorain, Ohio. He was Chicago regional manager and in 1958 was named one of the firm's two product sales managers.

Emil W. Carlson was named manager of **Republic Steel Corp.**'s Buffalo district to succeed **Robert P. Carpenter**, now manager of the Cleveland district. **Leo R. Silliman** was made assistant manager, Buffalo.

J. Lee Wieland was appointed general sales manager, **American Chrome Co.**, Hinsdale, Ill., subsidiary of Goldfield Consolidated Mines Co.

William M. Raynor was named general sales manager of **Foote Mineral Co.**, Philadelphia. Director of purchasing since 1956, he succeeds **Boyd E. Cass.**

John J. Giba was made manager, Tele-Dynamics Div., **American Bosch Arma Corp.**, Philadelphia.

Thomas W. Lawless was made purchasing agent of **Weaver Mfg. Co.**, Springfield, Ill., a division of Dura Corp. He succeeds **Orville W. Ellis**, retired.

Claude W. Campbell was made director of industrial engineering for **Acme Steel Co.**, Chicago, and subsidiaries. He formerly served the company as chief industrial engineer.

Robert B. Ryan, vice president, was elevated to the presidency of **McLaughlin Co.**, Birmingham, Mich. **Robert D. Martin**, former secretary-treasurer, was made vice president.

Lonay Nelson was made chief engineer of **Hyster Co.'s** subsidiary, Lyster Ltd., Glasgow, Scotland.

Ralph L. Countryman was made a vice president of commercial marketing for **American Bosch Arma Corp.**, Hempstead, N. Y.

William W. Crossman was made manager; **Robert J. Martin** sales manager of **Hitemp Inc.**, newly formed subsidiary of Hitemp Wires Inc. in Monrovia, Calif.

Frank T. Christenson was named vice president, **Refractory & Insulation Corp.**, New York. **George A. Mies** was named assistant vice president, Western Div.

Blaw-Knox Co. promoted **William D. Kohlins** from division manager to vice president-general manager of its **Buflovak Equipment Div.**, Buffalo.

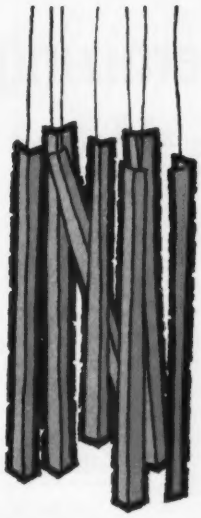
Norden Div., Stamford, Conn., United Aircraft Corp., promoted **Kenneth A. Bacon** to chief-component sales; **Soren C. Ibsen**, chief field sales; **William R. Kincaid**, chief-systems sales; and **Robert F. McCorkle**, chief-sales administration.

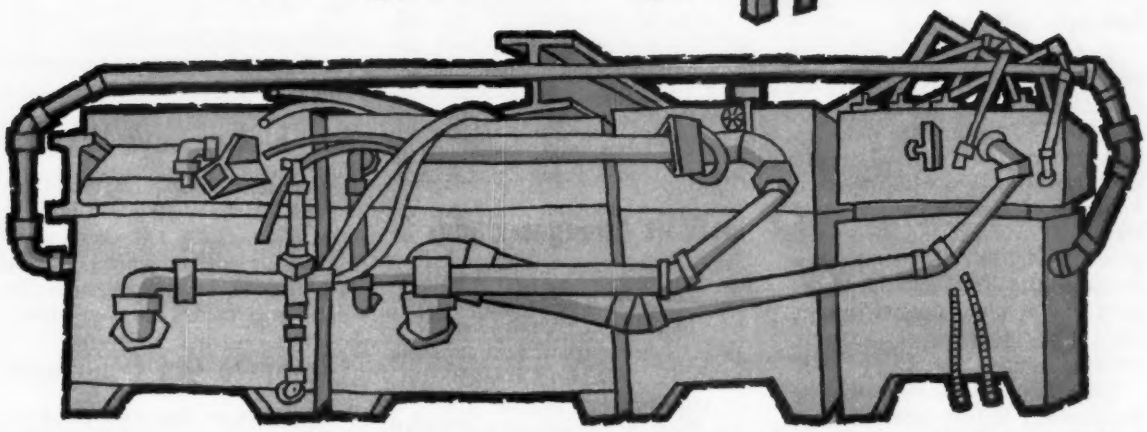
OBITUARIES...

Earle C. Smith, 69, chief metallurgist and director of research for **Republic Steel Corp.**, Cleveland, died May 20.

Jerome L. Thies, 54, president, **Fenton Foundry Supply Co.**, Dayton, Ohio, died May 15.

when CHEMICALS and MACHINES work together...

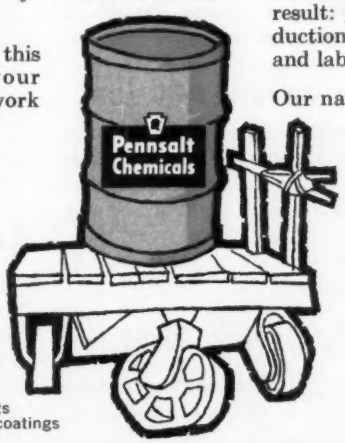




METAL FINISHING DOLLARS WORK HARDER

If you operate a medium-sized aluminum fabricating plant, for instance, your annual cost of chemicals used to prepare metal surfaces for finishing may total around $60,000, while your automatic equipment for these processes may have cost a half-million or more.

You can get the most out of this investment only when your machines and chemicals work together. Pennsalt's System Approach to metal surface preparation gives you this economic extra. Because we supply both chemicals and equipment, we have the specialized know-how to treat your metal finishing line as an integrated system. The result: your investment pays off in high-speed production, product quality, lower costs for chemicals and labor.



Pennsalt Metal Finishing Equipment
Washers
Automatic coating machines
Automatic phosphatizing machines
Automatic pickling machines
Drying and finish bake ovens
Paint spray booths
Complete finishing systems

Pennsalt Metal Processing Materials
Cleaners for all metals
Etchants and brighteners
Descaling and pickling compounds
FOSBOND® phosphating agents
FOSCOAT® pre-lubricant coatings
FOSLUBE® drawing lubricants
DRAWCOTE® deep-drawing lubricants
Paint strippers and strippable vinyl coatings

Our nation-wide service organization assures you of *continued* top performance from chemicals and equipment. Our trained specialists not only aid in installation and start-up, but also make regular service calls to keep your finishing line running at its best.

Let us show you how the Pennsalt System Approach can make your finishing dollars work harder. Write for free Booklet 309, "The Pennsalt Metal Preparation Service Plan."

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PENNSALT CHEMICALS CORPORATION
East: 3 Penn Center, Philadelphia 2, Pa.
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Porter Modernizing Mill At Riverside Metal Works

RIVERSIDE-ALLOY METAL DIV., H. K. Porter Company Inc., is installing additional casting facilities, lathe equipment, and a new cleaning line at its Riverside Metal Works wire mill, Riverside, N. J. The project will mark the completion of the second major improvement campaign at the plant since it became a part of Porter. In 1956, $1.5 million was invested in new strip mill facilities.

Modernization of the wire mill was designed around the division's continuous casting technique, says W. H. Thompson, vice president and general manager. The program began in 1958 with the installation of continuous casting equipment. It enabled the division to produce 1000 lb coils containing as much as 10 miles of unwelded phosphor bronze wire. Special spooling and processing equipment was installed last year.

Subsequent addition of two, 102 in. diameter Roberts pressure filters increased the plant's filtered water supply by 50 per cent. Those filters and four smaller ones produce plant process water for general cooling purposes. The filter plant expansion also included increased pumping and straining capacities, as well as the enlargement of buildings.

Another recently completed project was the installation of a new unit substation, boosting electrical capacity by 20 per cent.

The division has announced a new tradename for its brand of stainless spring wire: Isoloy.

H. M. Harper Expanding

H. M. Harper Co., Morton Grove, Ill., will complete a $1,250,000 improvement and expansion program in July. The project includes construction of four building additions (containing about 26,000 sq ft of floor space) and a variety of new equipment for production of stainless steel alloys. H. M. Harper, president, says a new arc furnace installation, already in operation, has increased the company's metal production capacity by more than 300 per cent. The increased output will be used in the sale of extruded industrial shapes and for increased internal requirements in Harper's Bolt Div.

American Stamping Grows

American Stamping Co., Euclid, Ohio, is building a 16,000 sq ft addition to its factory and has installed five presses. Their capacities: 1500, 500, 400, 300, and 150 tons. The 1500 ton press was built by Verson Allsteel Press Co., Chicago.

DeWalt Changes Hands

All capital stock of DeWalt Inc., Lancaster, Pa., a subsidiary of American Machine & Foundry Co., New York, is being transferred to Black & Decker Mfg. Co., Towson, Md., in exchange for 120,000 shares of the Black & Decker stock. DeWalt will be operated as an independent subsidiary of Black & Decker under the direction of Conde Hamlin, president.

AMF has purchased the Maxim Div. of Emhart Mfg. Co., Hartford, Conn., manufacturer of distillation equipment and a wide variety of noise suppressors and silencers.

Opens Sulfuric Acid Unit

Pittsburgh Chemical Co., a subsidiary of Pittsburgh Coke & Chemical Co., Pittsburgh, has opened its new sulfuric acid plant at Neville Island, Pa. The facility boosts Pittsburgh Chemical's capacity by 70 per cent.

Installs Oxygen Plant

An oxygen plant with a capacity of 420 tons a day is being shipped to Mingo Junction, Ohio, for installation. It was designed by Hydrocarbon Research Inc., New York, to feed the open hearth furnaces and bessemer converters of Wheeling Steel Corp. The plant will be operated by Hydrocarbon Research and Wheeling Steel through a jointly owned company, Mingo Oxygen Co. The oxygen will be piped to Wheeling's nearby plant in Steubenville, Ohio. Cost of the oxygen plant: More than $6 million.

Sparton to Build in South

Sparton Corp., Jackson, Mich., will construct a $1 million facility for its Electronics Div. in the Southwest. The facility will be equipped to manufacture and to conduct research and development in specialized devices used by Atomic Energy Commission prime contractors and for special, highly reliable, electronic and electromechanical devices incorporated in prime weapons systems.

Lau Blower Buys Viking

Lau Blower Co., Dayton, Ohio, purchased the Viking Air Products Div. of Crane Co., Cleveland, maker of blowers and humidifiers for warm air furnaces and supplier of components to the air moving industry.

Gibson to Get Equipment

Directors of Hupp Corp., Cleveland, have approved a $1.8 million replacement and modernization program at its Gibson Refrigerator Div. in Greenville and Belding, Mich. The program calls for installation of a new automated line for cutting sheet metal to proper lengths for forming, relocation of forming presses, and addition or replacement of other machinery and material handling equipment.

Industrias Integradas S.A. has been organized and will build a plant in Valencia, Venezuela, to manufacture Gibson products.

Expands in Colombia

Aluminium Ltd., Montreal, Que., proposes to expand its fabricating facilities in Colombia in partnership with Industrias Metalurgicas Unidas SA and with the aid of other local capital. The extrusion plant of Perfiles de Aluminio y Cobre Ltda. (in which Aluminium Ltd. already participates) will be expanded by the addition of a 1250 ton extrusion press. Alcan de Colombia SA is being formed and will be jointly

owned by Aluminium Ltd. and Colombian interests. This company will construct a sheet rolling mill in Cali, Colombia.

Skinner Buys Chuck Line

Skinner Chuck Co., New Britain, Conn., acquired the Horton chuck line from the Geometric-Horton Div., United-Greenfield Corp., New Haven, Conn. A major part of the Horton line includes large size chucks up to 60 in., and a line of electric chucks, types, and sizes not manufactured by Skinner.

Will Build Morgan Units

Morgan Engineering Co., Alliance, Ohio, has licensed Dominion Bridge Co. Ltd., Montreal, Que., to build and sell Morgan designed equipment throughout Canada. Morgan Engineering designs and produces special steel mill machinery.

Transfers Machine Line

The testing machine product line of the Electronics & Instrumentation Div., Baldwin - Lima - Hamilton Corp., Philadelphia, has been transferred to Wiedemann Machine Co., King of Prussia, Pa. The transfer does not include the Baldwin SR-4 strain gages, transducers, and associated instrumentation which will continue to be manufactured by the division at Waltham, Mass.

Acquires Rea Divisions

Idaho Maryland Mines Corp., Glendale, Calif., acquired the business and assets of Ferro Cast Div. and Magnetics Div. of J. B. Rea Co. Inc., Santa Monica, Calif. Ferro Cast produces investment castings while Magnetics Div. produces precision memory devices.

CONSOLIDATIONS

American Pulley Co., including its Hubbard Spool Div., has been merged into **Van Norman Industries Inc.**, New Bedford, Mass.

Stolper Steel Products Corp., Menomonee Falls, Wis., purchased **Plasticon Inc.**, El Monte, Calif. Newly named officers of Plasticon are: Chairman, D. D. Wensink; president, Walter Podolak; executive vice president, O. H. Kessler Jr.; and secretary, L. A. Gerlach.

Ford Motor Co., Dearborn, Mich., will purchase **Sherman Products Inc.**, Royal Oak, Mich., subject to approval of the latter's stockholders. Sherman makes power diggers, backhoes, and industrial loaders for tractors; and two types of transmissions.

ASSOCIATIONS

John E. McIntyre, Sibley Machine & Foundry Corp., South Bend, Ind., has been elected vice president, **Gray Iron Founders' Society Inc.**, Cleveland, to fill the unexpired term of J. E. Quest. Mr. Quest has left the foundry industry to assume the post as president and chief executive officer of Unipress Co., Minneapolis, and its wholly owned distributing company, Midland Laundry Equipment Co.

Powder Metallurgy Parts Manufacturers Association has united with the **Metal Powder Industries Federation**, New York, to become the sixth of the federation's autonomous trade associations. MPIF has re-elected Dr. G. A. Roberts, Vanadium-Alloys Steel Co., Latrobe, Pa., president, and K. H. Roll, executive secretary and treasurer. PMPMA elected these officers: President, Carl Demrick, Amplex Div., Chrysler Corp., Detroit; and vice president, R. C. Burgess, Burgess-Norton Mfg. Co., Geneva, Ill.

Other associations within the federation have elected these officers: **In-Plant Powder Metallurgy Association**, P. V. Schneider International Business Machines Corp., New York, president; **Metal Powder Producers Association**, C. E. Hanson, Metals Div., Crane Co., Chicago, president; **Metal Powder Core Association**, B. J. Falk, Arnold Engineering Co., Marengo (Chicago), Ill., president, and R. D. Ponemon, Pyroferric Co. Inc., New York, vice president; **Ferrite Manufacturers Association**, D. L. Almquist, Stackpole Carbon Co., St. Marys, Pa., president, and H. R. Delaney, Crowley Div., A. O. Smith Corp, Milwaukee, vice president; **Powder Metallurgy Equipment Association**, N. K. Koebel, Lindberg Engineering Co., Chicago, president, and Samuel Bradbury III, F. J. Stokes Corp., Philadelphia, vice president.

V. B. Anderson, V. B. Anderson Co., Santa Ana, Calif., has been elected president of the **National Welding Supply Association**, Philadelphia.

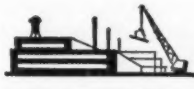
Industrial Research Institute Inc., New York, elected these officers: President, R. G. Chollar, National Cash Register Co., Dayton, Ohio; vice president and president-elect, Dr. H. S. Turner, Jones & Laughlin Steel Corp., Pittsburgh.

NEW OFFICES

Detroit Steel Corp., Detroit, opened a district mill sales office at 2600 Poplar Ave., Memphis, Tenn. Frank W. Hughes is manager of sales for the district.

Shieldalloy Corp., Newfield, N. J., established a sales office in the Oliver Bldg., Pittsburgh, Pa. William Brand is district sales representative in charge of the office. The firm produces ferroalloys, master alloys, and metals, and processed minerals and ores.

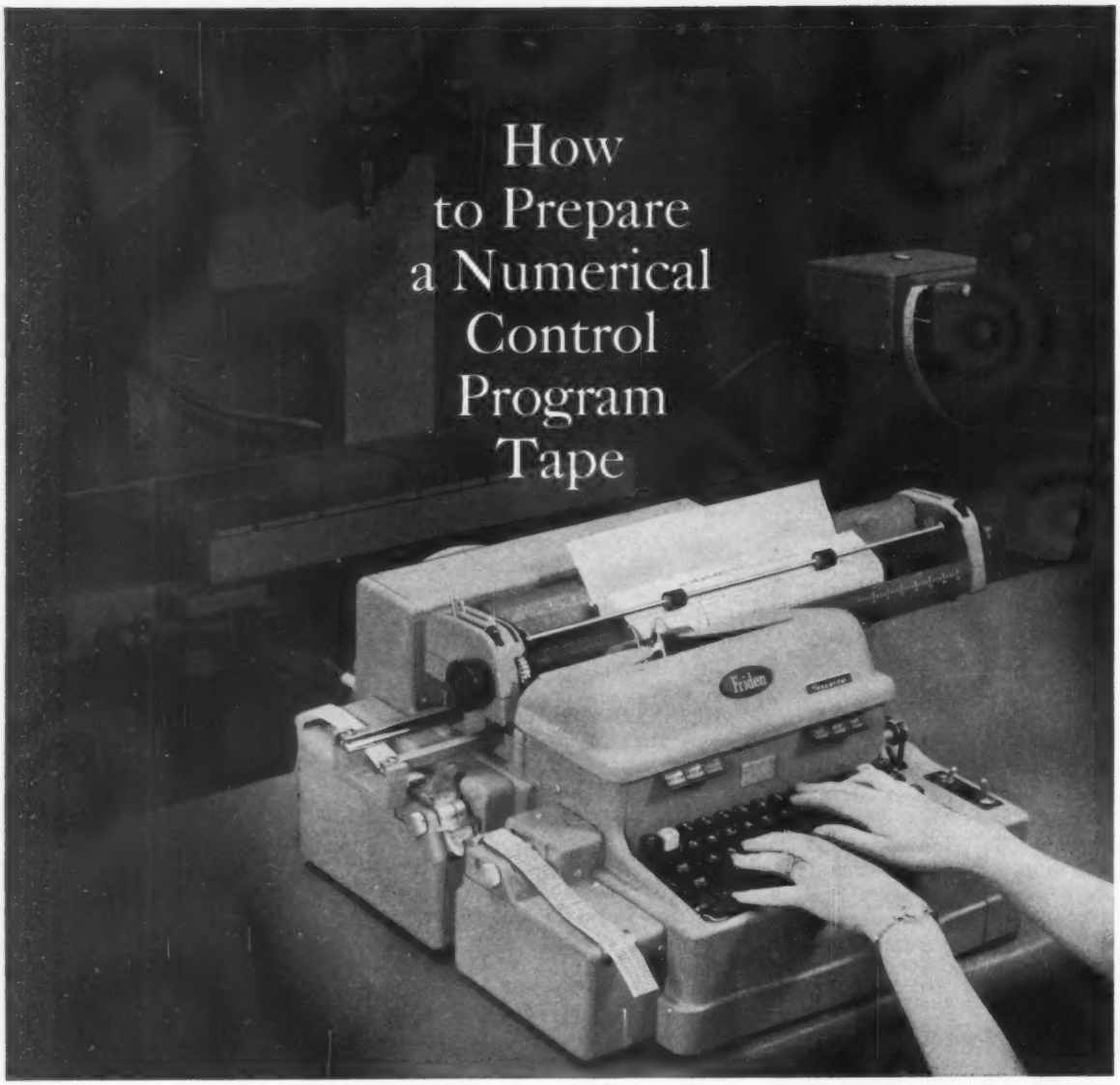
Traylor Engineering & Mfg. Div., Fuller Co., Allentown, Pa., moved its branch to 3909 Field Bldg., 135 LaSalle St., Chicago, Ill.



NEW PLANTS

Engineered Electronics Co., production subsidiary of Electronic Engineering Co. of California, has opened its 25,000 sq ft plant at 1441 E. Chestnut Ave., Santa Ana, Calif.

Samuel Son & Co. Ltd., Toronto, Ont., is erecting a $2 million building. It will contain 95,000 sq ft of warehouse space and 12,500 sq ft of office space. The firm operates a steel and aluminum service center.



(An Industrial Revolution In One Easy Lesson)

This is the Friden Flexowriter: a heavy-duty, automatic electric typewriter, with an integral tape punch and tape reader. There is no faster, easier or better device for coding paper tapes. Here's why:

1) The keyboard is standard; any competent typist can master the other controls in less than an hour.
2) The operator types a visual proof as she makes the tape; errors are caught and corrected immediately.
3) Automatic parity check guarantees against mis-coding.
4) Tapes can be double-checked (or quickly duplicated) by running them through the reader.

For all these reasons, the great majority of machine tool manufacturers either *have standardized* or *are now standardizing* on the Friden tape reader with Flexowriter input. Take it from the pioneers in numerical control: punched paper tape is the best input; and in punched paper tape. Friden is by far the leader.

In business, communications, graphic arts, and now in heavy industry, Friden source data systems build a new concept. We call it PRACTIMATION: automation so hand-in-hand with practicality there can be no other word for it. ©1960 FRIDEN, INC.

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Technical Outlook

PLASTIC WINDSHIELDS—It's a safe bet that automobiles of the future will have them, claims Dr. Herman Mark, Brooklyn Polytechnic Institute. This may be an answer to some of the industry's defrosting problems, since ice wouldn't stick to them. Plastic windows and windshields will need surface hardening treatment to prevent marring, but since they're not as brittle as glass, they'd be a boon to car safety.

WELDING COATED STEELS—"In no case have we found the effects of protective coatings (paint, galvanizing, oils) disastrously harmful to welding. Usual results were a slight deterioration of running properties of the electrode, impaired slag behavior, and an occasional slight loss in x-ray soundness." That's the opinion of M. K. Williams, Murex Research Laboratories, Waltham Cross, Hertz, England, who points out that few or no opinions have been available on the subject.

REMOTE QUALITY CONTROL—A television camera mounted above the shearman's control booth presents simultaneous views of an I-beam on the roller bed and an illuminated gage scale to control thickness, says Charles D. Bryant, chief engineer, Grimson Color Inc., Inwood, N. Y. The system is installed in a large Eastern rolling mill.

AID TO POWDER COMPACTS—Visten plastic film bags help in hydrostatic powder compacting techniques, says Visking Co., Chicago, a division of Union Carbide Corp. Advantages claimed: Permits use of inexpensive die materials; permits compacting of large pieces (example: 10 in. tungsten electrodes 4 ft long). The method was also described in STEEL, Apr. 11, p. 93.

BERYLLIUM GIVEN PUSH—Norair Div., Northrop Corp., Hawthorne, Calif., reports success in extruding bare beryllium in pieces as thin as ⅛ in. up to 29 ft long. It reports properties between 80,000 and 100,000 psi, 6 per cent elongation. Quality is still not up to expectations, however, since voids are occasionally being experienced. J. A. Van Hamersveld, general supervisor, materials research and product analysis, says much more work still needs to be done in alloying and casting into quality ingots for extruding and forging. Next on the agenda: Forming study of sheets. He reports small quantities are gradually becoming available for research.

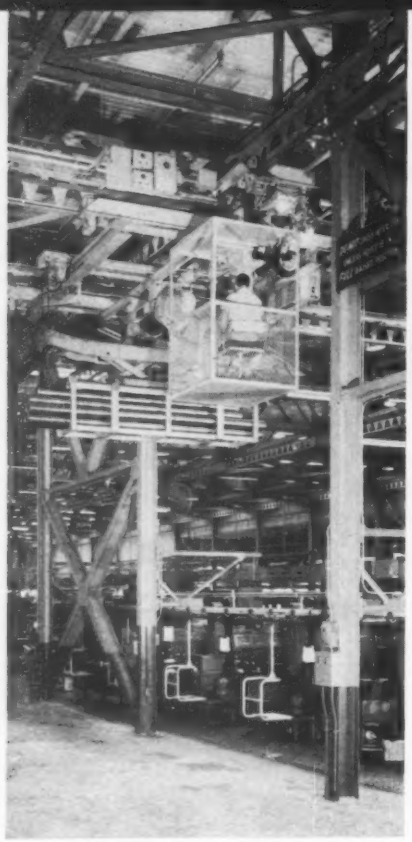
OUTSIDE ELECTROLYTIC GRIND—North American Aviation Inc. will convert its huge Cincinnati beam mill to electrolytic grinding of honeycomb panels up to 6 by 12 ft. The Los Angeles planemaker says it will handle single and double contours more satisfactorily than present methods. Speeds will probably reach 72 ipm with a cut 1/16 in. deep and 3 to 4 in. wide. Contours will be controlled by tracers. Tool wear ratio will be about 7 to 1.

SOLVE TOUGH MACHINING—How do you machine a 15 or 20 ft hemisphere so that the wall thickness doesn't vary more that 0.002 or 0.003 in.? Lockheed Aircraft Corp., Burbank, Calif., is doing it by a tracer technique that uses the inside diameter of the hemisphere as a reference point to control position of the tool machining the outside surface.

DUCTILE MOLYBDENUM—Work at Norair Div., Northrop Corp., Hawthorne, Calif., has shown that molybdenum sheets can be bent cold, then straightened without cracking. The firm is developing whole, molybdenum honeycomb, sandwich structures. It reports some progress in coatings that work well at 4000 to 5000° F. (For short time-temperature periods.) It can be soaked for longer periods at 2500 to 3000° F. Norair can also spotweld molybdenum satisfactorily.

STRONGER HOMES—Structural steels in family dwellings are on the increase, especially in the West, says Samuel H. Clark, district engineer, American Institute of Steel Construction, New York. Steel beams permit larger glass areas, freeing architects from some design limitations.

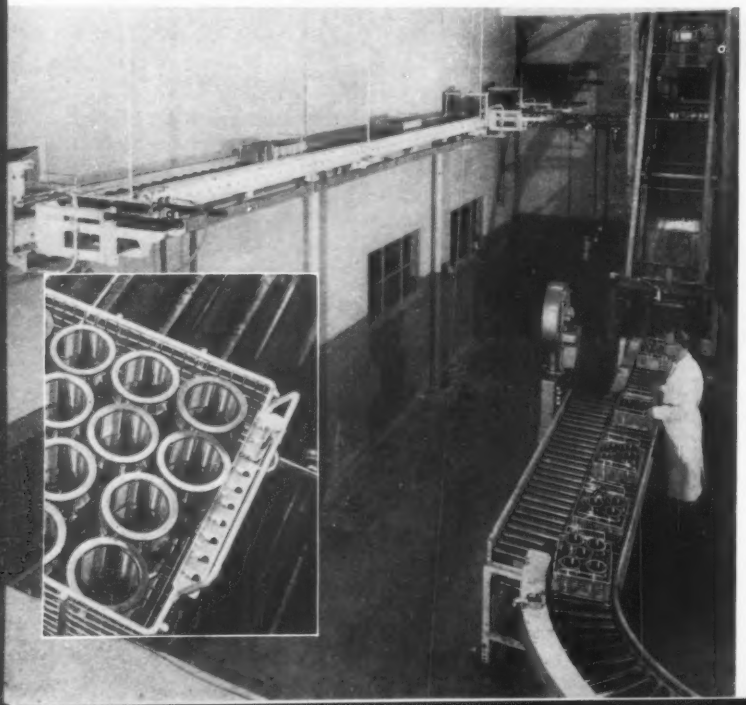
Bearing Maker's New Plant Hikes Product Output



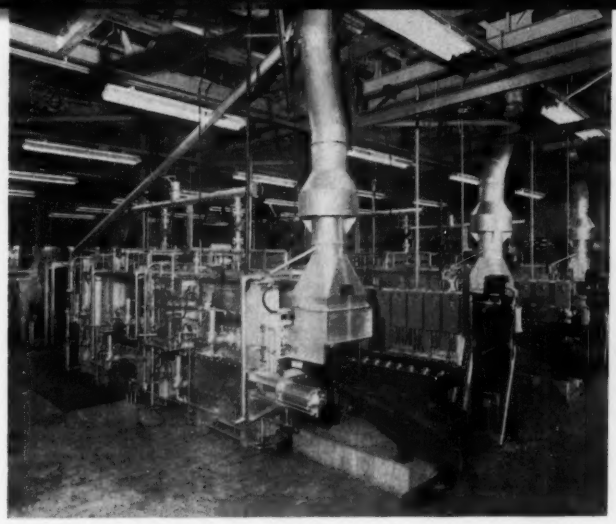
1. Crane operator takes a load of seamless tubing from material storage to the machining bay. On a crossover, the crane cab and trolley rides from a set of crane girders in one bay to a set in the other—tubes are handled only once

2. In this department, 33 multiple spindle bar machines and six chuckers do the preliminary machining on bearing components. Chips are removed under the floor to a disposal system (STEEL, Jan. 18, p. 90) and coolant is supplied from a central system

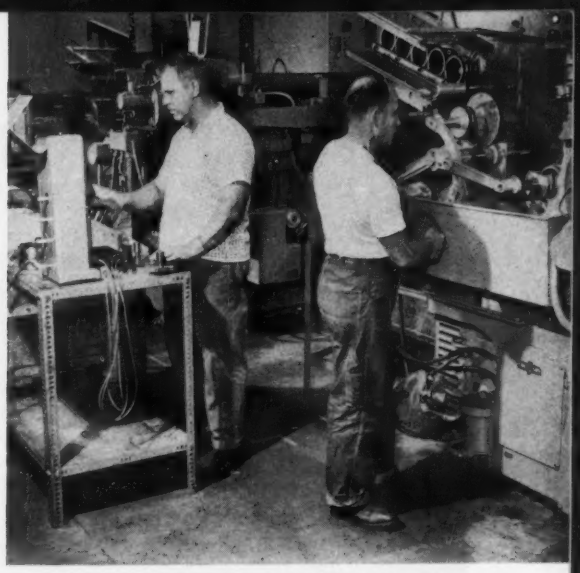
5. Finished bearing parts are sent in wire baskets through a full inspection. Baskets ride the elevator (right rear) to conveyor that passes a series of chutes which go through the wall, across a corridor, and into the part storage area. Manually set pins (inset) on the baskets trip the correct chute opening



6. An operator, riding a traveling elevator cart, picks up the baskets of parts as they're delivered to the storage area. After the racks on the cart are loaded, he raises or lowers the elevator and runs the cart up and down the aisles between storage shelves. Lifting is left to the cart



3. Semifinished machined bearing components are heat treated in one of these three parallel Surface Combustion furnace lines. Heat treating is done in the 1525° F range for 40 to 60 minutes. Parts are then oil quenched, washed, and drawn at 350 to 425° F



4. A battery of Cincinnati grinders finishes the raceway on the inner rings. Machines are hopper loaded—mechanical arms deliver parts from the hopper to a magnetic chuck. Most of the finish grinding is done to surface finishes of 6 to 8 microinches rms. Gages by each machine protect precision

7. Machine here gages the inner and outer races, automatically selects the ball size that will properly fill the gap, and drops the balls into place. Women complete the assembly with retaining rings and other components

8. In huge final assembly area, parts are delivered from storage on overhead conveyors. Other components, like cast housings, are paraded in on carts propelled by an under-the-floor chain. Finished assemblies move down the line to the packing and shipping department at rear

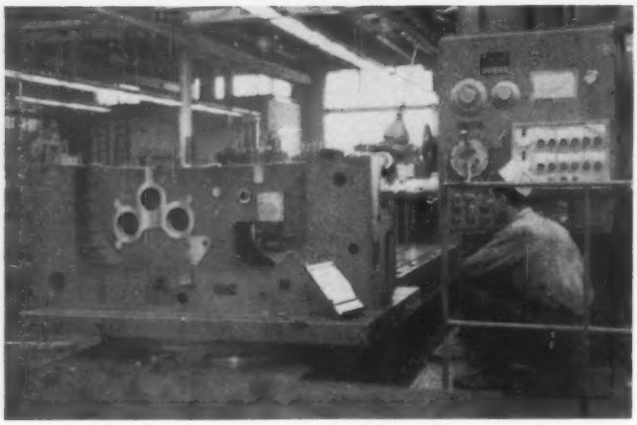
IN a move to double its bearing business in the next ten years, Link-Belt Co. has completed a new plant at Indianapolis. It will turn out self-aligning ball bearings, ball and roller bearing transmission units, and the company's new product—high precision, spherical roller bearings.

• **Geared to Long Runs**—Nearly all material handling is mechanized. Parts move through the plant on roller conveyors, overhead trolleys, or in carts that are pulled through departments by chains running under the floor.

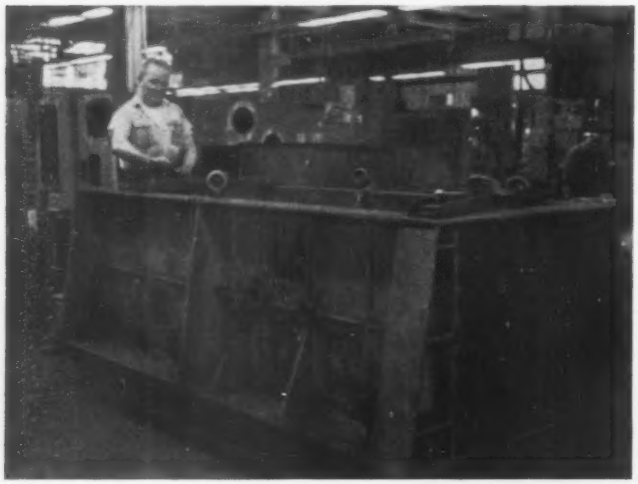
Most of the machine tools are automatic. They are loaded from hoppers, have automatic cycles, and they discharge parts mechanically. After every operation, the parts are gaged. For example, a spherical roller bearing with 42 rollers involves 758 gaging operations. Sixty-nine different kinds of gages are used on the components of a single spherical roller bearing before final assembly.

With 50 per cent more capacity than the former plant, the facility is designed for straight-line flow of all products, from the raw material storage to the shipping department.

How to Plan for Numerical Control



The large casting being machined above is a base for a Lawson paper cutter made by Miehle Co. It's being machined on one of the company's two horizontal drilling, boring, and milling machines built by Kaukauna Machine & Foundry Div., Giddings & Lewis Machine Tool Co. The fixtures normally used for the part (see below) generally cost about $40,000. Now the fixture is a piece of tape. Further, the improvement in accuracy has simplified assembly of the complex machinery



IN THE NEXT five years, most metalworking managers will face the decision to buy, or not to buy, numerically controlled production equipment.

That decision, say most of the experts, cannot be based on the same evidence used to acquire normal production machines. The numerical control concept, they point out, has implications that can affect nearly every phase of your production and engineering command—can even influence your over-all company capabilities.

What are the principal areas of potential benefits? What are some of the potential problems?

STEEL got answers to those questions from both builders and users of numerically controlled equipment. Here are their most frequently mentioned tips.

Product Design

• Flexibility of the control systems may make your company more competitive than it ever has been.

J. B. Rankin, staff co-ordinator for numerical control, at the Ft. Worth, Tex., plant of Convair, a division of General Dynamics Corp., says that his company's tape controlled machines have substantially aided it in getting contracts in competitive bidding. A small job shop reports that it can bid for some jobs at prices less than half what it would bid without tape.

Flexibility makes it practical to change product design almost the minute the change is approved. Otherwise you might hesitate because of the tremendous tooling and other costs that would go with the change. This factor, one builder points out, can become important even to the mass production industries.

Contouring with numerical control can rid the designer of the orthogonal strait jacket he's had to deal with—fancy parabolas may be desirable, and they're no more trouble to program than the circle the designer may have settled for in the past.

Tooling Savings

• The costs of both fixed and perishable tools should drop with numerical control.

At Miehle Co., a division of Miehle-Goss-Dexter Inc., Chicago, W. G. Schalk, plant engineer, reports the firm would normally have spent at least $75,000 to tool up for its model 40 Lawson paper cutter line. "With tape controlled machines to do the work, tooling cost us only $20,000."

Savings of that proportion aren't rare since the tape takes over for much of the jig and fixturing.

The impact of tape control in the perishable tool area is more easily missed. E. E. Kirkham, chief development engineer, Pratt &

Whitney Co. Inc., West Hartford, Conn., says: "Probably 90 per cent of the cutters in the toolroom go there too soon because they have been misused."

With tape control, the right speeds and feeds (prime tool lifesavers) can be set in the program, and they are not subject to operator interpretation. The proper care of the tools becomes a prime responsibility of the engineer who does the programing, and better tool utilization will almost always result.

But improved utilization is dependent on scientific knowledge of the operation. John Wolf, manager, incentive standards department, Warner & Swasey Co., Cleveland, told STEEL that, with tape control, you need factual information on things like machining speeds and feeds and on cutter design. You can't rely on operator "feel" for these data.

Programing

• Process engineering will become a new kind of job, but most companies have the kind of man needed for it. Some additional training is almost a foregone conclusion.

Process engineers will dictate how the part shall be made and will give the shop all instructions needed to make it. They must be heavy in shop experience because they will be completely responsible for the selection of tools and their grinds, their size, and their placement.

At a recent meeting of the American Society of Tool & Manufacturing Engineers, W. E. Niemond, head of the tape center, Electronic Control Systems (Los Angeles), a division of Stromberg-Carlson, said, "Close liaison between engineering and manufacturing must become a matter of reality for the propagation of sound numerical control manufacturing procedures."

Most sources say that programing can be learned by any competent engineer, and that once the company is accustomed to numerical control, programing is no problem. Training is a must; nearly every machine and control maker offers courses. The Controls Section, Bendix Aviation Corp., Detroit, for example, offers a comprehensive course on all phases of tape preparation. User companies send groups of men for a week's indoctrination.

Before you buy numerical control, consider standardizing on the programing techniques and the control medium.

The case at the Flight Propulsion Div., General Electric Co., Cincinnati, shows how standards help. At the A.S.T.M.E. meeting mentioned previously, Manufacturing Engineer C. E. Chapman reported: "We selected the 987 Flexowriter tape code on the 1 in., eight-channel tape. The Electronic Industries Association has since standardized on the same code. Six of our rotary tables all have the same machine code. We find that a standard input gives us flexibility in shifting work from one machine to another, or in utilizing a spare table for maintenance purposes."

Production Control

• Parts that used to take days in the shop now go through in hours. Production men must plan for that pace.

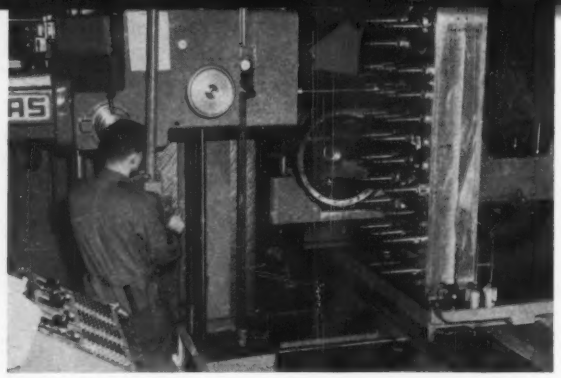
Peter Rusnov, chief industrial engineer, Warner & Swasey, says: "These (numerically controlled) machines have an insatiable appetite for work, which means that pieces must be kept flowing to and away from them. In a small lot, high variety industry, the problem can become complex. Though the annual volume may appear to be ample to fully occupy the automated equipment, the day to day work load can fluctuate from severe overload to no load, unless planning is done to balance out the flow."

Consider just three of many production gains cited:

The compact wood rack above, with its marked plastic bottles, holds the tapes that have replaced drill jigs and fixtures for this numerically controlled jig borer in the

Pratt & Whitney Co. Inc. plant at West Hartford, Conn. The displaced tools used to take most of the shelf space in the toolroom racks shown at right

Empty spindle, drive dogs positioned horizontally, waits for the traveling magazine to deliver the specified tool



Toolholder is in the spindle. It will be seated and locked, then pulled from the ball-detent socket in the magazine

Tool Changer Aids a Tractor Line

HEAVYWEIGHT castings for rock and earth moving tractors and loaders are being bored, milled, drilled, and tapped via tape control on a production line basis at Eimco Loader Div., Eimco Corp., Salt Lake City, Utah.

The method, ordinarily considered a low volume, specialty approach, is lopping 90 per cent off machining time. For example, the main frame for the Model 123 front end loader, formerly required about 150 manhours to mill, drill, and tap. A Lucas horizontal milling, boring, and drilling machine equipped with General Electric controls "does a better job, faster, uses less fixtures, and provides unparalleled versatility for future engineering changes," says Les Seager, production engineer at Eimco.

● The key to the success of tape control on this job: A tool changing device developed jointly by Lucas and Eimco.

Heavy duty preset tools are held (ball and detent) in a vertical magazine; there's room for 30 tools. The tool magazine rides on the machine table. By coding the head, table, and saddle positions, the programer can direct the machine to pick up any of the stored tools at the proper time in the machining sequence.

Driving key slots in the tools are maintained in alignment by locating keys in the magazine. A. J. LeBrun, sales manager, Lucas Machine Div., Cleveland, New Britain Machine Co., says that through the tape coding, the spindle rotation is stopped to within 0.0001 in. of the required location to engage the driving slot of the tools for the program tool changing. Tools are automatically locked in or ejected from the spindle as programed.

The main frame casting goes to the Lucas for milling of some pads, drilling and tapping on four planes, and precision boring of bearing and register diameters.

● With the tool changer, the one tape controlled machine does the work of several conventional horizontal machines, achieving both dollar and floor space savings.

Eimco engineers originally figured to buy a Lucas 5 in. boring mill without tape control. They planned to augment it with a $55,000 traveling head radial drill. The setup required two trunnion fixtures, both motorized. Total fixture cost: $26,000.

Engineers at Wiedemann Machine Co., King of Prussia, Pa., have shown that one of its turret punch presses, with tape, is about five times as fast as its manual predecessors; Frank J. Fields, president, Fosdick Machine Tool Co., Cincinnati, cites a job performing 441 operations on 167 holes in a machine side frame—it takes 35 hours manually, 7½ hours on a tape guided jig borer, would take 6 hours with depth control, and 4 or 5 hours with automatic tool change; at the Goss Co., Chicago (another division of Miehle-Goss-Dexter), a tape controlled Jones & Lamson positioning table on a column type drill press has cut production time 30 to 40 per cent on nearly every job the engineers have used it on.

Inventories

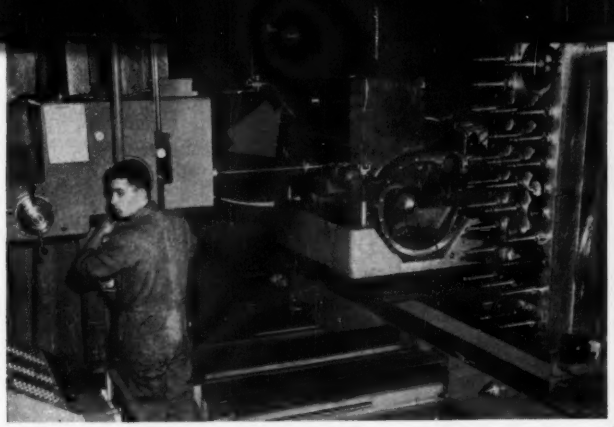
● The increased speed with which you can set a job up and run it off may permit you to tolerate lower inventories of parts.

Carl F. Stugard, vice president and manager, Special Machine Div., Cincinnati Milling Machine Co., Cincinnati, spells this one out: "One advantage of numerical control, not always realized, is its ability to cut stock inventories. When it becomes economical to produce one part or only a few at a time, it will no longer be necessary to maintain a large inventory of semifinished products. Thus numerical control can make economical the manufacturing of replacement parts to order, including typical off-the-shelf items."

Accuracy

● Numerical control does not, and can not, improve the accuracy of a machine. It does, however, improve its repeatability.

Although you'll want to talk tolerances with the builders whose equipment you consider, you generally can expect to get consistent performance at a tolerance level that equals the best an operator will do. Hole locations of ±0.001 in. and repeatability of about half



The magazine has moved away from the spindle, and the machine table is ready for drilling on the casting

"After initial evaluation, we decided to use numerical control in our heavy construction equipment production because it promised maximum production efficiency. Although our initial equipment cost was higher than it would have been for conventional machines, the long range savings have already begun to mount," says Joseph Rosenblatt, president, Eimco Corp.

The tape controlled machine cost less than that equipment program. In addition, Mr. Seager says the tape actuated equipment is more versatile, more productive, and more reliable since a good measure of the human fallibility factor has been ruled out.

"With the machine, including tool change, under the instructions of tape, the system paces the operator, not the reverse," Mr. Seager told STEEL.

● With the shakedown production runs out of the way, and with procedures established, Eimco is getting into tape controlled machining on all major castings for its full line of rock and earth moving machines.

The company has six tape controlled machines: Lucas 4 and 5 in. horizontal boring mills; a Lucas 4 in. vertical drilling, milling, and boring machine; two No. 3 E-15; and one 4U Potter & Johnson automatic turret lathes.

Programing is done at Eimco. Its experience: Any competent engineer can handle the job. All drawings are being redimensioned on the co-ordinate system to aid in programing, and new parts will be dimensioned this way.

A final plus noted by Mr. Seager: A boss inside the major opening in the main frame casting can be milled easily since sequence positioning of the tool is determined by the engineer and the tape program. Tucked at the upper right edge of the opening, the boss would be a difficult spot to machine with any of the conventional manual techniques.

that are not uncommon, can be even closer. At Brown & Sharpe Mfg. Co., Providence, R. I., the need for accuracy, coupled with reasonable costs, moved production men to turn to tape control.

Improvements in consistency can help trim inspection costs. Many of the things an inspector looks for are operator errors, not machine errors. With most of the opportunity for operator error removed, tedious inspection procedures can be replaced by thorough inspection of the first piece, then periodic checks to make sure tool wear is not causing out-of-tolerance parts.

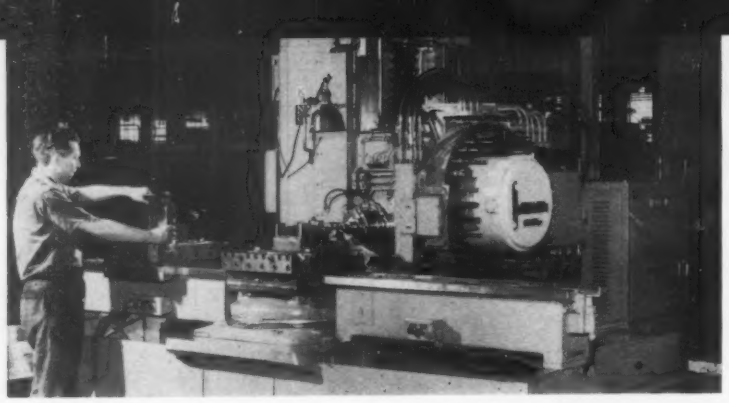
A second gain from the repetitive quality may show up further down the production line. M. E. Setzke, tool engineer in charge of numerical operations, Miehle Co., says: "If we got nothing more than the improvement in quality and accuracy, numerical control would still be paying its way. We have virtually eliminated hand fitting of parts on the erection floor.

The third, and most obvious, gain from consistent accuracy is the reduction of scrap and rework. A check at Warner & Swasey showed that operators on a DeVlieg Jigmil with tape control caused only a slim 0.9 per cent below-standard work—50 to 90 per cent less than those on manual machines. Also, two numerically controlled Burgmaster turret drills have trimmed scrap losses by 13 per cent at Chandler Evans Corp., West Hartford, Conn.

Maintenance

● Initially, maintenance cost may be higher than for other production equipment, simply because of control complexity. But, over the long run, users say maintenance is no problem.

Two factors are involved: First, even though the controls are complex, a high degree of reliability has been built in. The trend toward static control elements and modular control segments has led this trend. In the Prodac system, made by Westinghouse Electric Corp., Pittsburgh, for example, whole control functions are represented by



At Warner & Swasey, this tape controlled machine is being used on tough production jobs. On 16 parts now in production, tooling cost was $10,000. W&S tooling experts figure tooling for conventional machining would have cost at least twice that sum

Tape Trims Production Times

At both Warner & Swasey Co., Cleveland, and Boeing Airplane Co.'s Wichita, Kans., facility, Kearney & Trecker Milwaukee-Matics have boosted the production rates on a variety of parts.

For example, on the first four parts programed through the machine, W&S engineers figured a one-third increase in production over what would be achieved with conventional methods. They based the figure on gains made in setup, locating, and removing parts (on a transfer shuttle, the next part is positioned while the machine works), and on tool adjusting time. They anticipate other gains, such as one in part quality, which they did not include in their figure.

At Boeing, where five of the machines are in production, the engineers report a wide range of gains, depending largely on the selection of adaptable parts. Reductions in production times run as much as 70 per cent.

In both companies, the machines (using General Electric punched tape controls) have trimmed tooling complexity and have permitted the combining of operations into one setup.

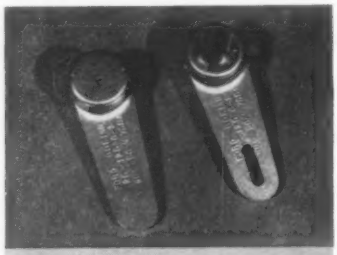
At Warner & Swasey, these figures illustrate the savings on four parts:

Part	Numerical Control (standard hours)			Conventional Machining (standard hours)		
	Cycle	Setup	Operations	Cycle	Setup	Operations
1	2.1	2.0	2	1.855	9.3	11
2	2.1	2.0	2	1.855	9.3	11
3	1.609	3.6	6	1.549	3.5	6
4	0.25	0.6	1	0.282	1.6	2
TOTAL	6.059	8.20	11	5.541	23.7	30

At Boeing, here are the results on two aluminum parts: Over-all savings include the cost of two fixtures, about two-thirds the run time, plus all time formerly used to set up.

CONVENTIONAL:
Two operations,
two holding fixtures,
119.42 minutes setup,
6.2 minutes run time

TAPE CONTROL:
One operation,
one fixture,
no setup time,
3.02 minutes run time



CONVENTIONAL:
Four operations,
three fixtures,
302.34 minutes setup,
39.15 minutes run time

TAPE CONTROL:
Two operations,
one fixture,
no setup time,
12.11 minutes run time

rugged plug-in units that can be replaced in minutes.

Most users and builders agree that maintenance must be carefully considered and planned for, but they also assure that good preventive maintenance, and a competent, trained man can hold the cost down and keep the machine running with little or no more lost time than you have on conventional, manually operated machines.

The Impact

Frank Moran, vice president, Carlton Machine Tool Co., Cincinnati, explains: "Up until a year or so ago, we had to open up numerical control discussions with customers, and many of them were skeptical. Today, they come to us to learn how they can use it to advantage."

Engineers at Ex-Cell-O Corp., Detroit, list six kinds of jobs where you should check on numerical control:

1. Where there are numerous setups and operations.
2. Where the operations of the machine are complex.
3. Where the setup time is too long in relation to the run time.
4. Where reduced leadtime is a must.
5. Where the part is complex, must be produced in short runs, with individual variations.
6. Where the part is so complex that producing large quantities introduces large problems of error.

You may have one final problem in evaluating numerical control. After you have analyzed what it can mean in your production operation, it may not be easy to believe the magnitude of potential savings. Explains Allen Hermanson, manager, Machine Tool Div., Sundstrand Machine Tool Co., Rockford, Ill.: "We sometimes run up against a believability barrier. Potential users simply don't trust even their own estimates. Yet because numerical control is a concept that can affect many phases of production and engineering, savings can come from many sources, and they can pyramid to awesome proportions."

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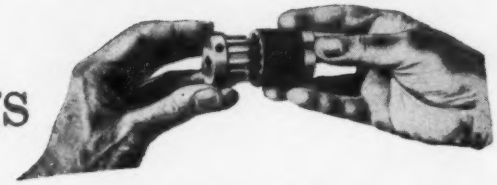
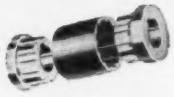
These couplings  are so simple in design  that their cost is compared with other couplings. Insist on having U.S. PowerGrip Flexible Couplings tried on your machinery and then watch your costs go down. Installation is quick and easy. No maintenance, no lubrication. Call now!

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Mill attendant at United States Steel's South Works flicks a few switches to turn ingots into slabs, blooms, or billets in the company's new structural mill

Newest Structural Mill Debuts

Said to be among the most modern of its kind, the facility at South Works of United States Steel, Chicago, uses punched card programing in the blooming and breakdown mills

U. S. STEEL CORP. has unveiled its most modern facility, an automated structural mill in operation at South Works, Chicago.

Under construction three years, the mill has its own soaking pits, a 53 in. blooming mill, a 40 in. breakdown mill, four finishing stands, and related equipment necessary to produce and ship the product.

Punch card programing is built into the blooming and breakdown mill stands. An array of electronic instruments, heat sensing devices, and logic systems keep the hot steel moving through the line until it emerges as a structural shape.

• **Doubles Mill Capacity**—Leslie B. Worthington, president of the corporation, says addition of the 34 in./46 in. mill will more than double the plant's capacity to produce lightweight, wide flange beams, and will provide about a 40 per cent increase in total capacity to produce wide flange beams of all weights.

The mill will also produce standard structural shapes, wide flange CB (Carnegie Beam, parallel flange) sections, sheet piling, and semifinished billets in carbon steel or high strength grades.

• **Growing Market**—"U. S. Steel increased its wide flange beam capacity to meet one of the most dynamic steel markets in the nation

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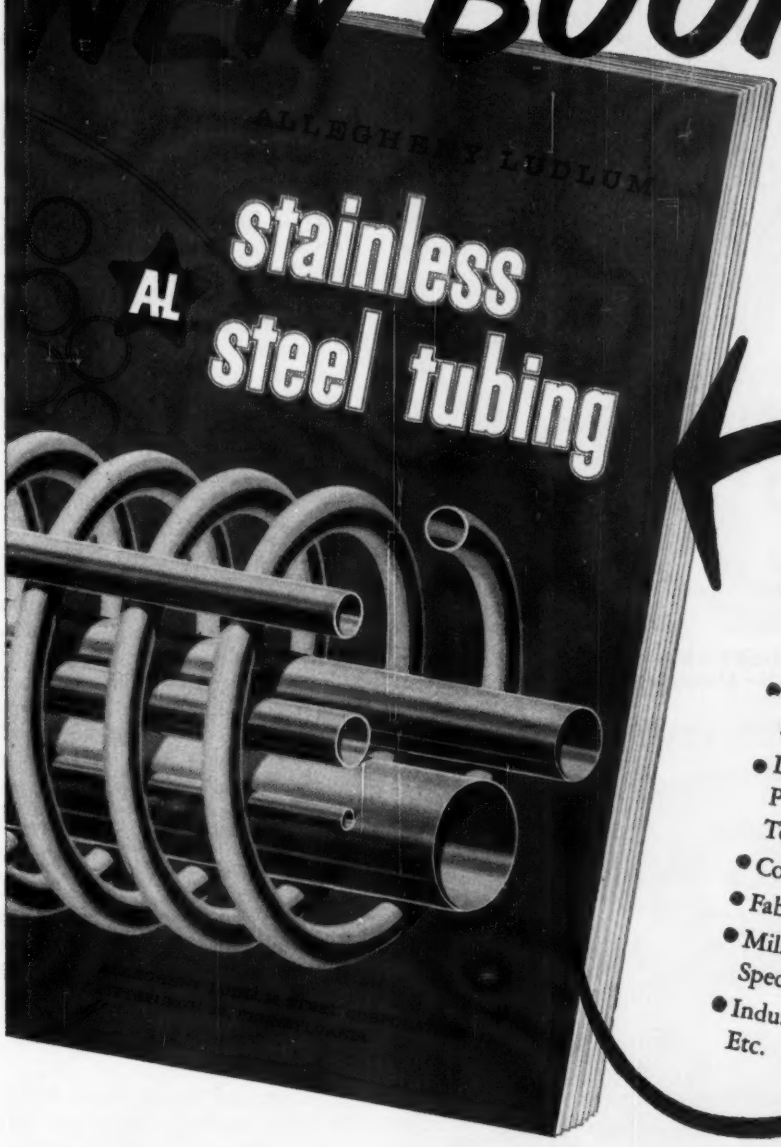

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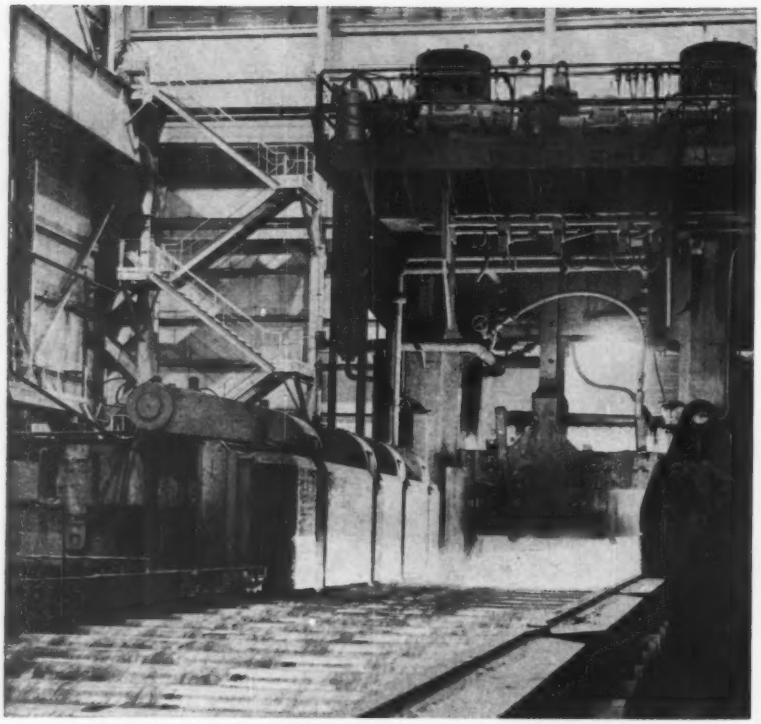
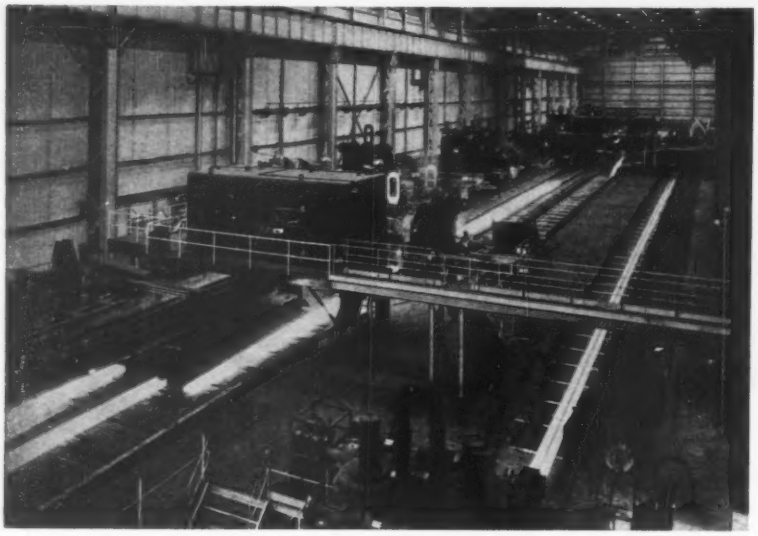




Ingots weighing up to 20 tons pass through the blooming mill (above). Then the four stand structural mill (below) rolls the blooms into I-beams or other shapes

today—construction of all types," Mr. Worthington explains.

"Doubling availability of lightweight beams at South Works will have a substantial impact on the nation's supply of steel needed for future community and commercial construction," he says. In addition, Mr. Worthington points out, the new mill will allow the plant's 52 in. mill to produce more heavyweight, wideflange beams, since it will no longer be needed to produce the lighter sections.

• **Automatic Control**—A Westinghouse Prodac control system guides the ingots through the several passes in the blooming mill, positions the manipulators, and signals the turnover equipment to rotate the ingot as required. A punched card tells the mill to roll a bloom or slab to the size required, which can be as small as 6 in. square.

Flexibility built into the control allows the pulpit operator to run the mill automatically, semiautomatically, or manually.

The breakdown mill is controlled by a General Electric punched card system.

• **From Ingot to Product** — After blooming, the semifinished steel may be directed through an automatic scarfing machine which can remove the surface of all four sides at once, or it may bypass the scarfer. The steel is then conveyed by rollers to a shear where it is cropped and cut to the length required for further processing. It then is transferred to a classification area or it can be further rolled without reheating.

Blooms to be formed into structurals are reheated to rolling temperature in gas-fired furnaces which can heat the steel to 2300° F. Reheated blooms pass through the card-programed breakdown mill where preliminary rolling and shaping takes place. After the required number of passes in the breakdown mill stand, the shape moves through four finishing stands which roll it into its final form.

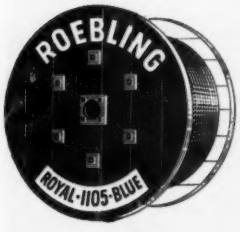
• **Finishing Stands Control** — Operation of the four finishing stands is controlled by an operator at the first stand. He manually controls the rolling in the first stand; the second, third, and fourth stands operate in sequence, depending on the action of the first.

An unusual feature of the mill is interchangeability of structural mill stands. For rolling various types of sections, any four of 13 different stands may be installed in the rolling line. An overhead crane lifts one stand out, replacing it with another structural stand in a few minutes.

"Quick changeover will reduce downtime and improve service to our customers by widening our product mix," relates Charles J. Hunter, general superintendent of South Works.

Finished sections are straightened, inspected and classified, and then cut to length by shears or cold saws, depending on the size of the shape and customer requirements.

IF THE WIRE ROPE YOU'RE USING HASN'T GOT IT HERE...IT HASN'T GOT IT



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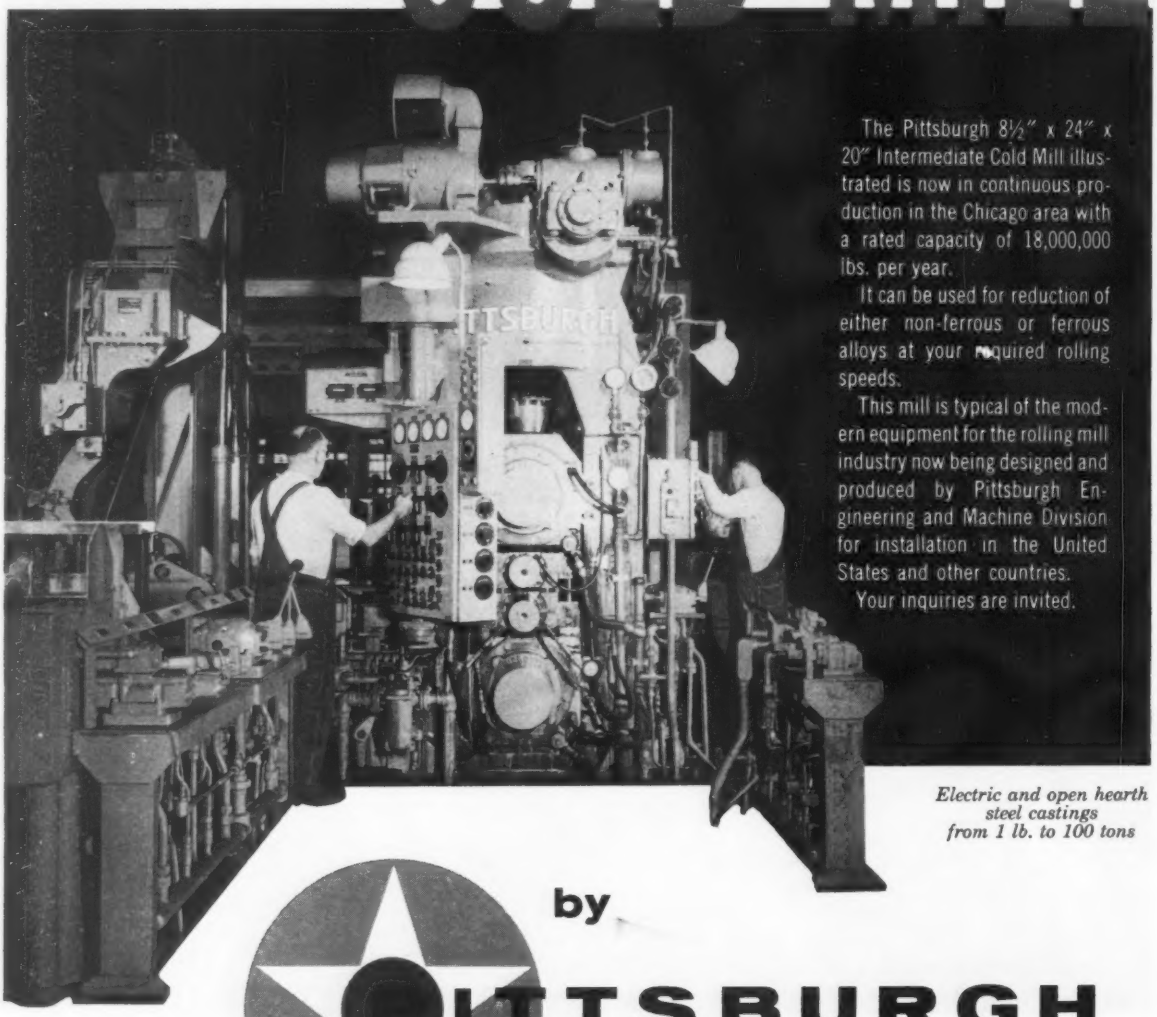
COLD MILL



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Automatic Gaging Boosts Production; Cuts Costs

In one application it has eliminated manual sorting; in another, it has reduced trimming losses

X-RAY and infrared gaging devices are attacking costs and increasing productivity in segments of the metal industry.

Two applications: Sorting scrap and measuring steel strip passing through finishing stands.

• **Sorting**—In this application, automatic classification and sorting of sheet scrap, miking and manual sorting are obsoleted. One system (XactRay, built by Weston Instruments, Newark, N. J., a division of Daystrom Inc.) can classify sheets in 25 gages, mark each with its gage number, and stack them according to thickness.

Such a system is in service at a Midwestern steel warehouse. One or two x-ray gages mounted on "C" yokes are placed on opposite sides of the conveyor. As the sheets flow by, an average thickness reading is taken. The signal is relayed to a console, which in turn sends out impulses to a servo marking unit stationed down the line.

A marker stamps the appropriate gage at 3 in. intervals along the length of each sheet. Changes in measurement are instantly registered to reflect the thickness of each sheet to be stamped.

Bins at the end of the conveyor receive the sheets through flaps arranged to open individually upon signal from the control unit. Each sheet slides under the proper flap, and self-stacks on a hydraulic-type bin fitted with rollers. As the bin is loaded, it is rolled out and another one inserted.

The operator selects the gage desired for each bin by setting a series of dials. The upper and lower limits of tolerance ranges can be set individually. Categories of materials classified, depending on the median thickness, can be held to tolerance variations finer than ±0.0001 in.

• **Strip Steel**—An infrared sensing gage has reduced strip costs at Armco Steel Corp.'s hot strip mill, Butler, Pa. Inadequate means of measuring formerly made it difficult to maintain uniform widths. Result: Inches of steel were lost in trimming.

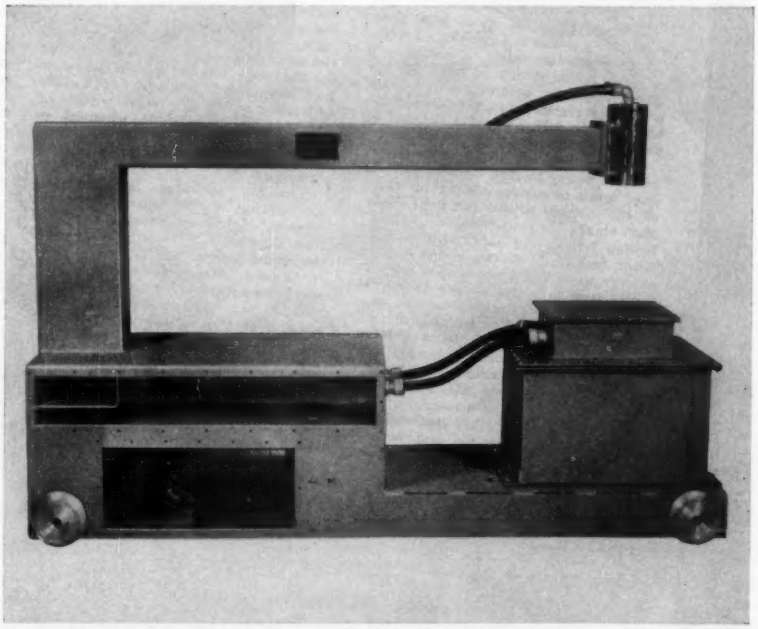
The Weston gage, called Infra-Ray, senses infrared rays radiating from the hot steel. It is responsive at strip speeds up to 2000 ft per minute and can operate when the strip edge is below the color range as long as the temperature is 900° F or more. Steam and oxide dust have no effect on its operation as long as sufficient radiation is reaching the gage head.

Sidewise strip movements of as much as 3 in. on each side will not affect accuracy of the gage, and there also is no adverse effect when speed changes are introduced. When calibration is necessary, the gage head is positioned over a unit that simulates various strip widths with infrared lamps.

In operation, the sensing head scans the width of the moving strip and transmits measurements to console equipment for translation to meters at the control station, speed pulpit, and roughing stand. By reading the meters, the operator controls the width by varying the rate of rolling.

The gage is enclosed in a heavy steel housing that's water cooled and is mounted 14 ft above the strip bed beyond the last of the mill's six finishing stands.

• **Operators Defended**—For years, operators have been blamed for width variation, but the gage revealed that mills before the finishing stands sometimes introduce unwanted changes.

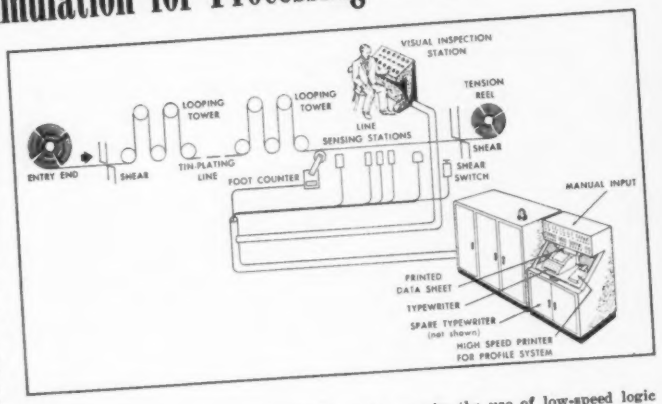


Gage is mounted on "C" yoke with x-ray pickup unit in upper cylindrical head and source in box below. X-rays are beamed through the sheets

Steps You Take Today...

Fred Wiles of our Apparatus Division describes an application of digital techniques to an industrial data logging problem.

Data Accumulation for Processing Lines



Industry's move toward continuous process production rather than quantized output production has brought a need for methods of logging data descriptive of the finished products. Some examples of such continuous output production processes in the Steel Industry are electrotinning lines, side-trim and inspection lines, continuous annealing lines, recoil lines, temper mills and cold reduction mills.

AIL has developed a Data Accumulation System for such process lines and has built a number of such systems. Such a system, operating on an electrotinning line, is shown in the illustration. The AIL design includes three identical computer sections operating in parallel. The answers from the three computers are compared on a two-out-of-three basis. If there is any difference in the three answers, the majority rules and the correct answer is printed out. Meanwhile, the system indicates that a disagreement has occurred.

The data are collected from a number of sensing devices mounted along the output section of the production line and from a manual station where visually detected defects are fed into the system. The sensing and manual entry devices are spread over some length of line. It is essential that all defects be correlated with the point on the strip at which they occur; this gathering of defect data into their appropriate points is accomplished within the computer unit.

The main section of each of the three computers accumulates the data into forty registers, each having a 29-bit capacity. Binary-coded decimal is used in the computer sections.

The output section of each computer provides buffer storage for the accumulated totals to compensate for the speed of the output printer or typewriter. The single two-out-of-three "voting" section follows the buffer storage computer sections. It causes the correct answer to be fed from the appropriate buffer storage to the output device via a binary-coded-decimal-to-decimal converter and a print-format programmer. The output device can be a printer, typewriter, tape punch, magnetic tape recorder, or other device.

The output of the AIL Data Accumulator provides a measure of the footage of prime quality material, the footage of reject material, and the total number and locations of occurrences of each type of defect. In addition, data such as order number, date, crew number, coil number, and other pertinent fixed information are printed out to provide complete and useful quality control records. The fixed information is manually entered into the system via dial switches or punched cards. Shift or daily totals are also included in the printout.

The computer sections utilize AIL plug-in transistorized logic modules (flip-flops, Nor units, driver units, and pulser units). The memory unit is composed of magnetostrictive delay lines; thus, the entire computer unit is composed of solid-state devices.

The twenty channels in each computer do not exist as separate physical entities. Rather, they exist in the timing with which they enter the recirculating delay lines. Each channel carries two types of totals, thus accounting for the forty totals in each computer. Each computer has only one high-speed arithmetic unit. The major portion of each computer services the channels in such a manner that the one arithmetic section operates sequentially on all the channels.

Another advantage of this time multiplexing is the utilization of the inherent high-speed capability of the delay lines without the requirement that the whole system use expensive high-speed units. One small section of high-speed computer elements separates, in a time-sharing manner, the pulses entering and leaving the magnetostrictive delay line. The output of this pulse-interleaving section is of low-frequency, suitable for low-speed components.

The relationship between the number of interleaves and the number of bits stored in the delay line is such that a bit leaves the line from one interleave and is re-entered into the line on the next interleave, progressing through all interleaves before returning to its original interleave. The required relationship exists when the number of bits and the number of interleaves are relatively prime. It is this interleaving that permits the use of low-speed logic units without the loss of the advantages of the high-speed delay lines.

Correct timing of the input information is accomplished by asynchronous operation of the delay lines. Incoming information from the sensors is stored briefly and then entered into the delay lines. The orbit time of the information in the delay lines is set at something faster than the speed of operation of the production lines. These two factors are so related that the required equalization is produced.

A footage tachometer accurately determines strip length. The tachometer is carrier-operated so that zero-spaced operation is possible. In additions, hysteresis effects are utilized to prevent the tachometer's adding in a large foot-count when the line stops quickly and the tachometer rocks back and forth between the edges of two of its adjacent segments.

Included in the system is a battery supply, which is switched on instantaneously when power fails. Thus, a power failure will not cause loss of information accumulated in the system.

A complete bound set of our fourth series of articles is available on request. Write to Harold Hechtman at AIL for your set.

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A DIVISION OF CUTLER-HAMMER, INC

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Shape Tomorrow's Processing Line

The high speed, automatic "closed loop" processing lines of tomorrow are being evolved through the planning of today. Integration of vital accounting, production and quality control information for optimum effective operation is close to reality. Cutler-Hammer-AIL Systems Engineers are daily acquiring new knowledge of processing techniques and requirements . . . making detailed analyses of factors contributing to the uniformity and quality of processing products.

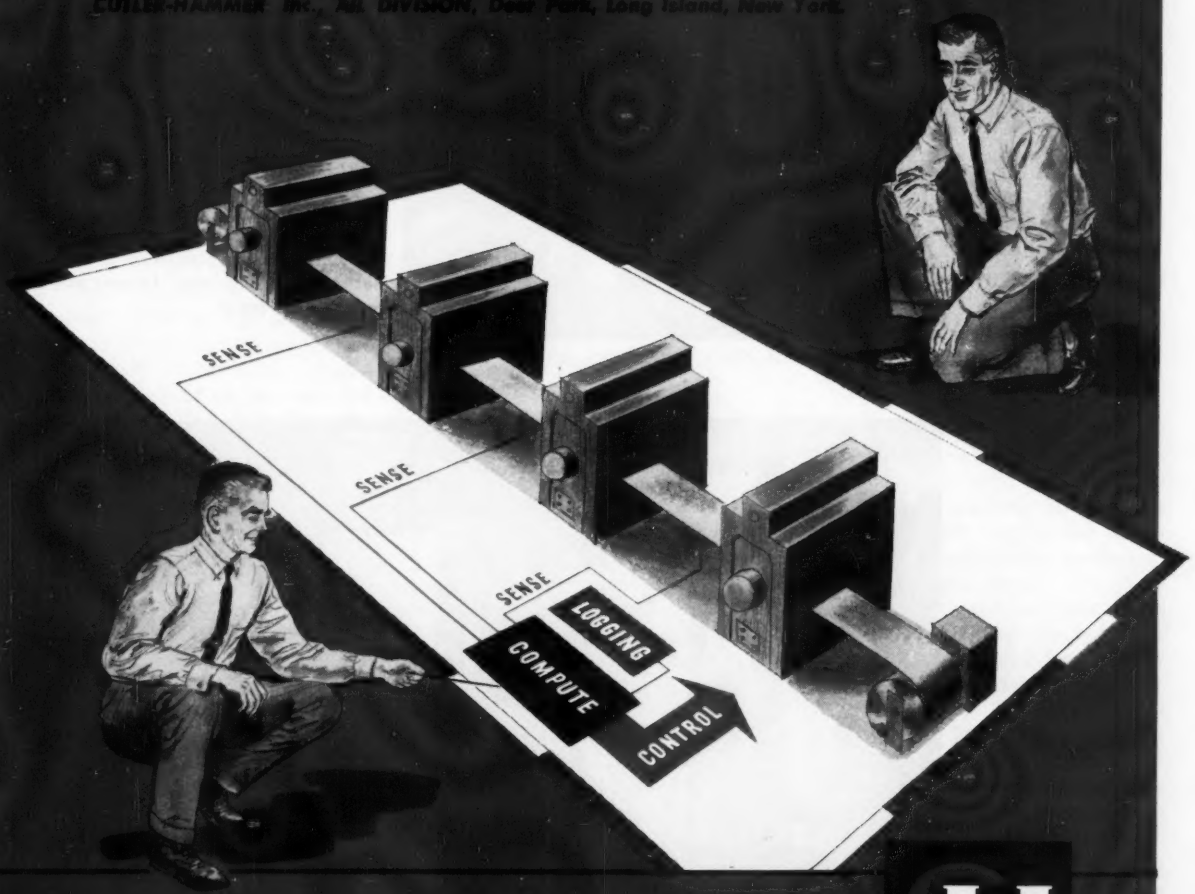
Drawing on long experience in electronic measurement, computation and control, they are successfully applying new, dependable solutions to problems of sensing, data accumulation and automatic control in metal processing. One such installation is discussed on the opposite page. If you plan to modernize your equipment, upgrade your product, speed up your production or simply want to take a closer look at your present processing line, we would like to hear from you.

TAKE STEPS TODAY to bring your future closer . . .

talk to the man with his mind on your future—your Cutler-Hammer Sales Engineer . . .

or write

CUTLER-HAMMER Inc., AIL DIVISION, Deer Park, Long Island, New York

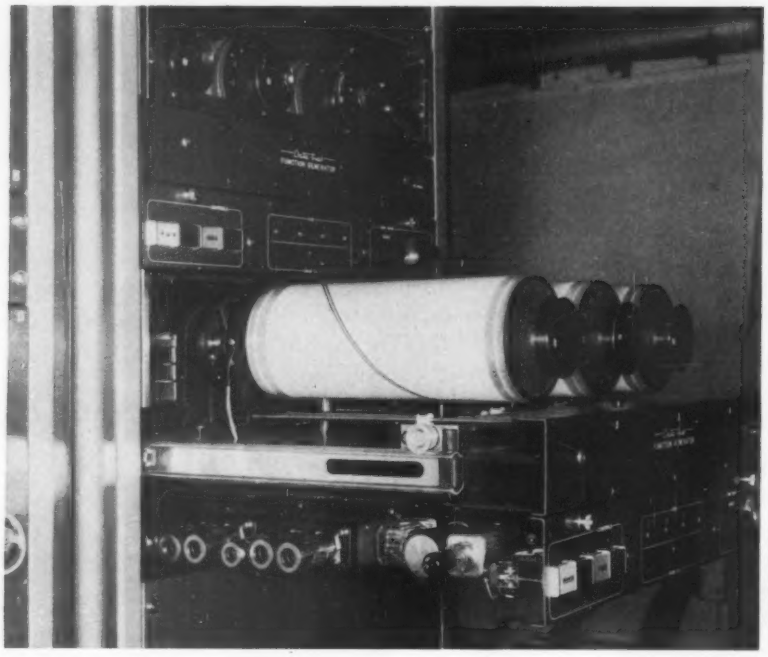


CUTLER-HAMMER, INC., AIL DIVISION
Deer Park, Long Island, New York

H
CONTROL

Infrared Simplifies Brazing

Extremely accurate electronic control of quartz heat lamps has opened the way to a faster, more efficient method of joining thin metal parts like honeycomb



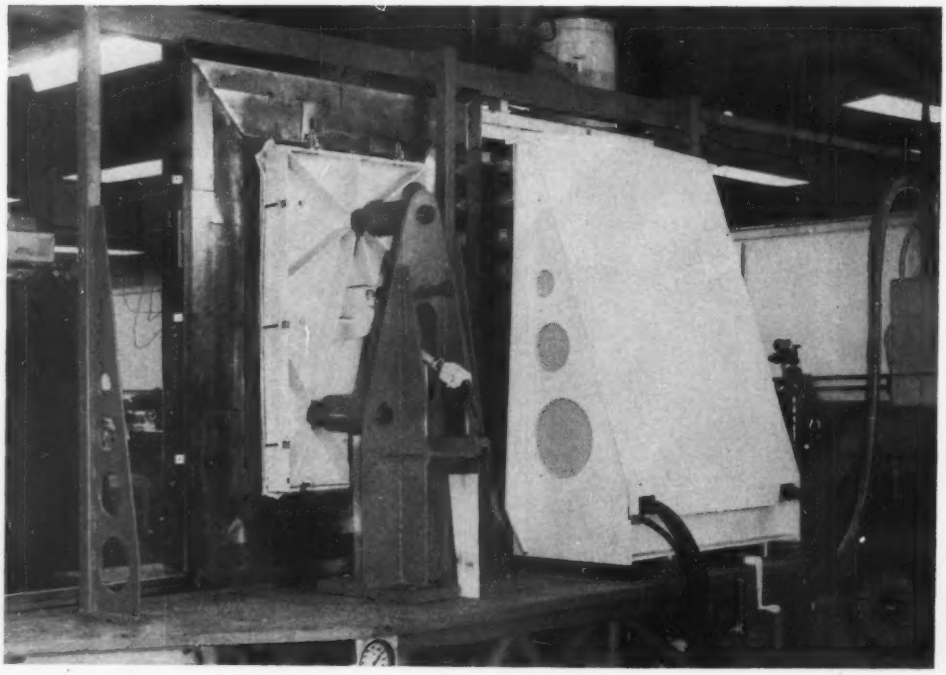
Precise time-temperature programing of Nortobraze can be plotted on these drums. Electronic tracking "eye" follows plot controlling heat input

BRAZING of flat thin sections as well as honeycomb panels should become considerably easier with a new process which relies on radiant heat generated by banks of quartz lamps (STEEL, Apr. 25, p. 69).

An automatic brazing machine based on that principle offers fast temperature rise, exceptionally accurate control, and a carefully regulated cooling cycle. Norair Div., Northrop Corp., Hawthorne, Calif., calls its process Nortobraze.

Honeycomb panels, for example, no longer require huge graphite inserts or heavy backup plates to insure even heating and support during brazing periods. A simple, shallow envelope of auto body steel serves those purposes adequately.

• Fast temperature rise and accurate control also permit Norair to do part of the heat treatment during brazing cycles. Physical test



Brazing machine developed by Norair Div. has opposed lamp banks (right) and chill die (left). Stainless panel in airtight envelope moves on trolley arrangement. Gold shields prevent overheating of fixturing

results have far exceeded expectations.

Whenever Armco PH-type steels are used in honeycombs, the brazing metal is selected to match the upper part of the heat treatment cycle. The speed of cooling and holding at the lower "soak" temperature is carefully regulated by the electronic lamp controls.

Panels submitted to customers for evaluation have exceeded specifications from 105 per cent to more than 1000 per cent. Fatigue is one example: A specimen was supposed to resist 100,000 cycles before failure. The Norair piece held up well for more than 1 million cycles.

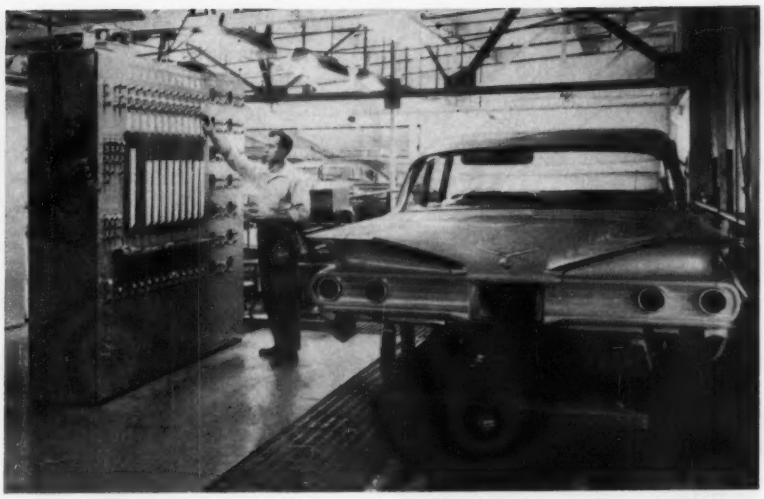
• The new machine features opposed banks of radiant quartz lamps set in patented gold plated reflectors, which are said to be the key to the method's success. Cooled clamping dies hold panels firmly during chill cycle. Temperatures up to 6000° F are claimed.

The honeycomb sandwich is built upon the bottom half of the steel envelope: First the outer skin, followed by brazing metal, honeycomb, a perforated sheet of braze metal (it permits venting of honeycomb cells for purging and evacuating), top skin, and the various edge members. The top half of the envelope is then seamwelded to the bottom half. Prewelded nipples permit attachment of vacuum and argon purging lines. A heat absorbent paint applied to both sides of the envelope increases efficiency.

To start the braze, an operator hangs the purged, evacuated envelope between the brazing lamps. Once the heating cycle has been completed, the holding device slides on a track carrying the assembly quickly and carefully from brazing position to chilling clamp for cooling.

• The Norair machine offers metallurgists a new way to study heat treatments.

The extraordinarily quick response of thin sections to heating and cooling has given Norair metallurgists a peek at unsuspected changes which take place in precipitation hardening steels. Careful redrawing of phase cooling diagrams has turned up many physical changes not detected in heavier bars which are usually studied.



Heart of body storage system is control center. Operator presses the correct button which automatically routes car to storage and times re-entry on production line conveyor

Programed Storage Line Smooths Car Production

Eleven conveyors provide a means for maintaining a small backlog, or to hold bodies until parts shortages can be corrected. One operator runs the whole works

HAMPERED by product size, a Chevrolet plant at Janesville, Wis., turned to a new type of electrical control to solve its material handling problem.

With the new system, a single operator removes car bodies from a main conveyor automatically, shuttles them to one of 11 storage rows, and replaces them on the main conveyor in a sequence and time schedule to fit production needs.

J. M. Cook, marketing vice president, Cutler-Hammer Inc., Milwaukee, says that the Chevrolet system which his firm helped design eliminates most of the temporary production gaps which were sometimes caused by a shortage of one body style. Various styles may now be fed into the production line in a more flexible sequence. Also, in case of a part shortage for a body style, the bodies can be held temporarily until corrections are made—a feature which was formerly impossible.

• The unit contains two memory units. One directs the removal of a car body from the line and the shuttling to a predetermined storage place; the other triggers the movement from storage to the production line at the right time.

Chevrolet needed an intermediate storage area between the next-door Fisher body plant and its assembly line. Each of the storage conveyors holds ten cars.

The Cutler-Hammer programing equipment is located at the point of entry. An operator assigns body styles to one of the storage conveyors by pushing the right button.

The same push of the button also triggers an electromagnetic memory unit which automatically discharges the car at the proper time. A second memory unit indexes the sequence in which the car body moves to the assembly line.

A "select-all" button also permits removal on a strict rotation basis.

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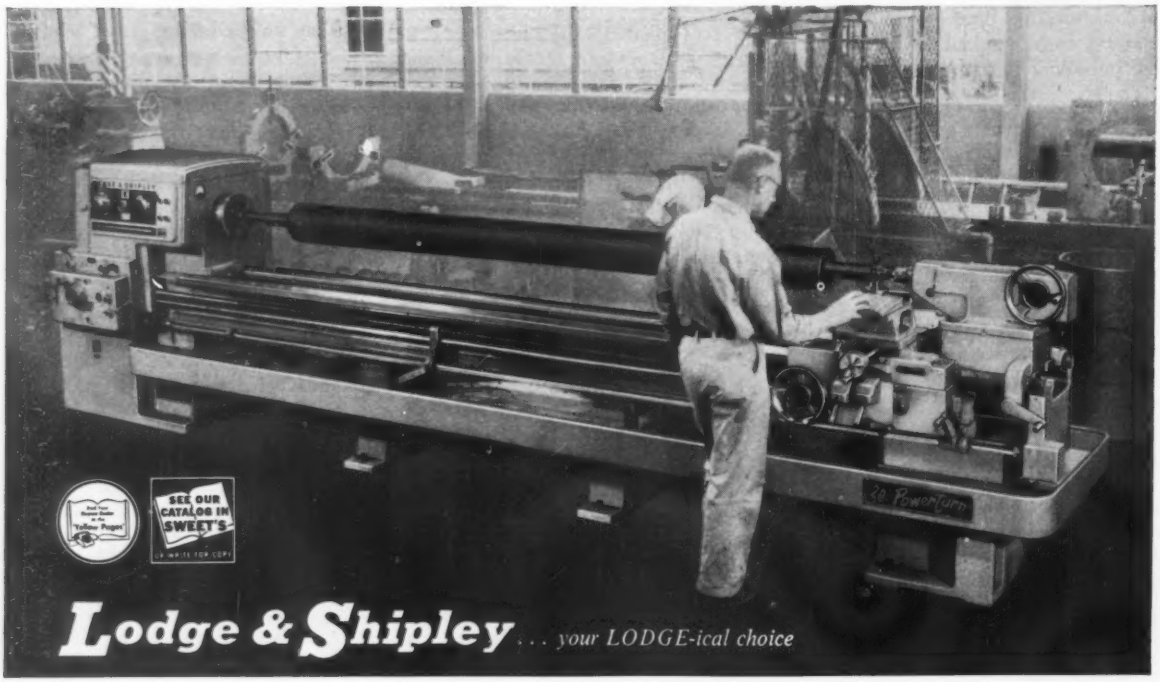
POWERTURN fits perfectly in the shop requiring the utmost in engine lathe performance. It pays its way every day with genuine versatility, giving accuracy in a wide selection of feeds and speeds required for a multiplicity of jobs.

Here's proof . . . in an installation at Packaging Corporation of America's Filer City (Mich.) Mill, where the shop foreman comments: "Every type of work is within the capabilities of this lathe" . . . "its accuracy is excellent, meets our most rigid requirements."

The POWERTURN Engine Lathe combines power and stamina with the most up-to-date features for precision and operating convenience . . . the qualities which have characterized Lodge & Shipley's 62-year history of users who "would make the same choice every time."

Whatever your turning requirements, consider Lodge & Shipley lathes: the best machine for a specific job or the greatest versatility for many jobs.

Write: Lodge & Shipley, Dept. L-107, 3070 Colerain Ave., Cincinnati 25, Ohio.



Heat Treating Furnace Washes, Draws Automatically

YOU can handle eight baskets of small tools or parts every hour with this automatic, gas fired, wash and vertical draw furnace. The unit operates at a draw temperature of 800° F, with a maximum of 1200° F.

The wash machine, furnace, and control panel are mounted on one base. The furnace shell (3/16 in. steel) is set up off the floor about 40 in. to allow space for conveyors and transfer mechanisms.

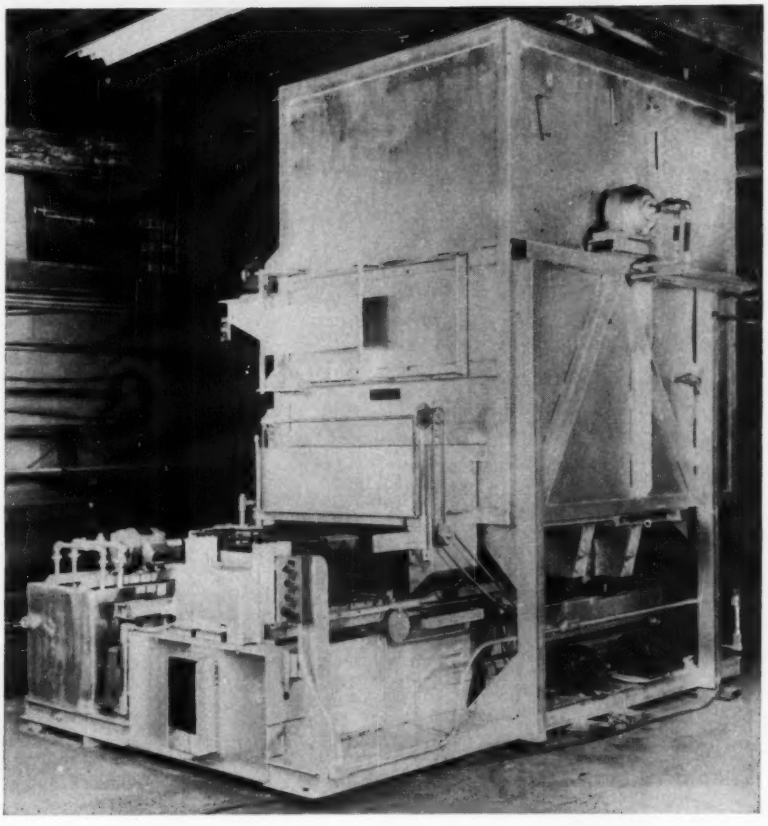
There are two large alloy sprockets in the top to receive a No. 458 rivetless chain which carries alloy workbaskets through the furnace. Conveyors under the furnace bring loaded baskets to the furnace to be picked up by the chain.

Elevators and conveyors are automatic, and indexing and cycling are controlled by a Westinghouse Cy-Pak system.

A motor driven pump feeds the sprays and circulates the solution at a rate of 100 gpm.

The furnace has fire brick and block insulation. A sealed-in burner is used.

For further information, *write* Dept. 9, Waltz Furnace Co., 1901 Symmes St., Cincinnati, Ohio.



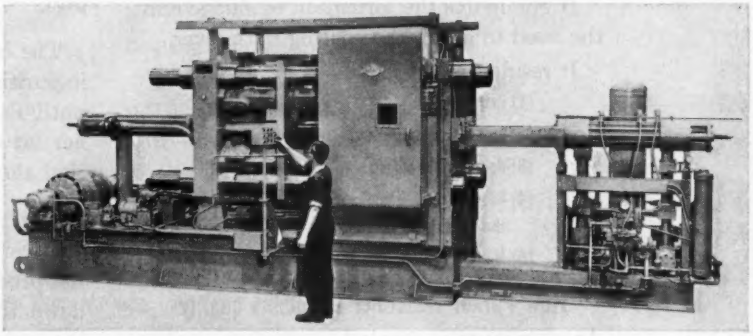
Aluminum Diecasting Machine Is Cold Chamber Type

A DIECASTING machine of the cold chamber, high pressure injection type for aluminum is rated at 1000 tons. It checks out at 1200 tons lockup pressure on the strain gage test.

Hydraulic and electrical safety features provide dual control in all areas. The machine weighs 85,000 lb and measures 26 x 10 x 8½ ft.

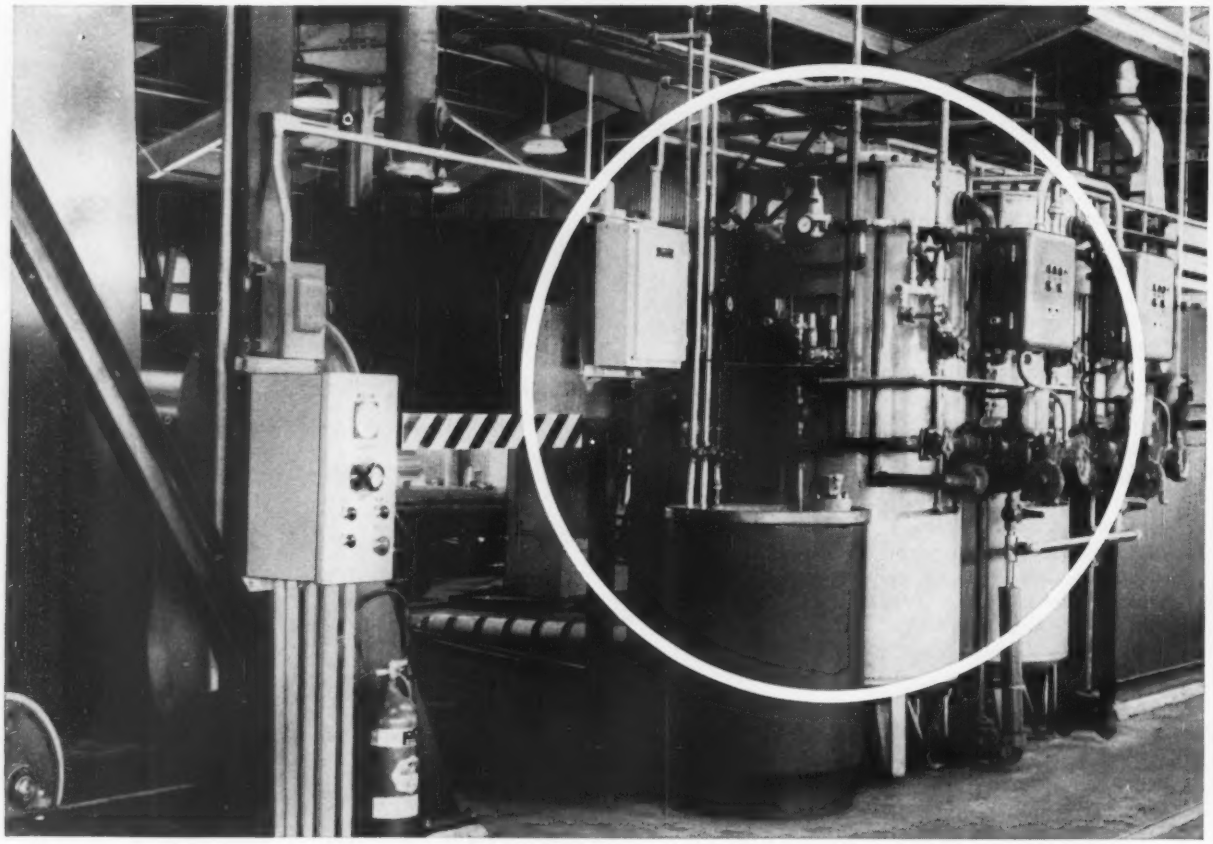
Four corner linkage provides full support for the die and good platen stability. The platens are 5 ft high, 5 ft wide and 1 ft thick. The four tiebars are 8 in. in diameter.

For further information, *write* Greenlee Bros. & Co., 2136 12th St., Rockford, Ill.



(*Please turn to Page* 90)

NOW! A QUALITY for BONDERITE coatings



This quality control center solves a serious production problem — the build-up of contaminating reaction products in the processing solution on high production strip lines for conversion coatings on aluminum.

It eliminates the formation of sludge and the need to dump the coating bath, ever.

It results in:

(1) Uniform quality

(2) Positive solution control

(3) Reduction in rejects and downtime

(4) Reduction of chemical consumption because the coating bath operates at low concentration

(5) Minimum sewage disposal problem

How Parker Reactifier maintains quality

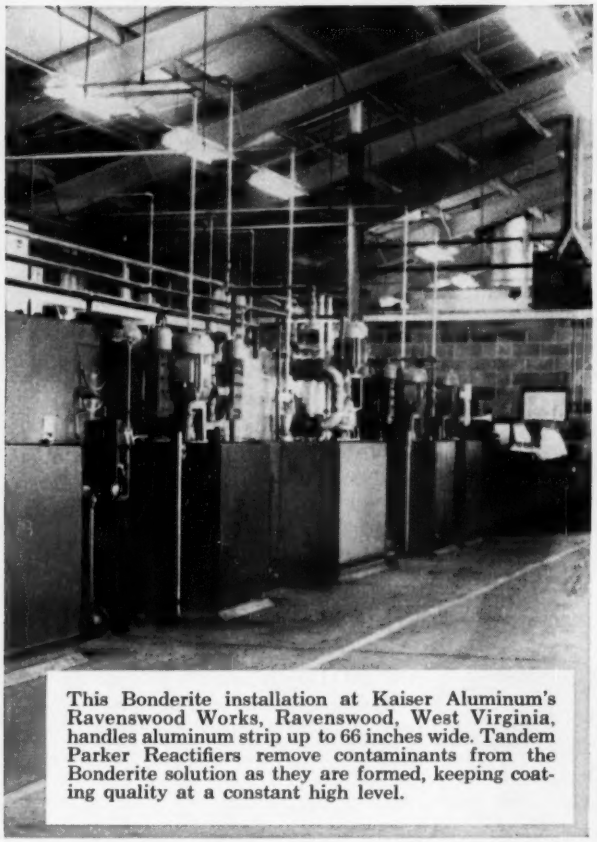
As aluminum is treated in any conversion coating solution, there's a build-up of reaction products, mainly aluminum and trivalent chromium, in the bath. Continued operation without removal of these impurities means slower coating action, sludge formation, and irregular and inferior coatings.

The control or removal of the interfering impurities stymied manufacturers for years until Parker developed the Parker Reactifier for use with Bonderite in high production aluminum lines.

The Parker Reactifier is an ion exchange unit connected in the circulation system of the processing solution. As Bonderite flows down through the cation resin bed in the Reactifier, aluminum and chromium are removed and the purified Bonderite is re-

CONTROL CENTER

on high production aluminum strip lines



This Bonderite installation at Kaiser Aluminum's Ravenswood Works, Ravenswood, West Virginia, handles aluminum strip up to 66 inches wide. Tandem Parker Reactifiers remove contaminants from the Bonderite solution as they are formed, keeping coating quality at a constant high level.

The Parker Reactifier, "Quality Control Center" of Bonderite for aluminum on high production strip lines. Bonderite enters at "A"; resin "B" removes impurities by cation exchange action; purified solution is returned at "C." Regeneration of the unit is accomplished by circulation of acid from tank "D" to cleanse resin of accumulated impurities.

turned to maintain the coating bath at top efficiency.

Proven by years of use

One Parker Reactifier has been in continuous use for over three years on a Bonderite high production aluminum strip line. In all that time there has been no deterioration of the cation resin, no sludge build-up, and no reason to discard the bath. This manufacturer now is installing a second strip line for Bonderizing aluminum with another Parker Reactifier for quality control.

In the comparatively short time Parker Reactifiers have been available, the largest manufacturing and fabricating plants have installed 30 of them to assure high quality coatings on aluminum.

You'll be proud of the finish on your product when you use Bonderite before painting. It improves paint life five to ten times. Call in the Parker man today!

Bonderites for aluminum meet MIL-C-5541 specifications.

Parker Rust Proof Company
2158 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

Since 1914—Leader in the field

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Since 1914— leader in the field

Cleaner Removes Oils, Soils from Ferrous Metals

RUST preventive oils, mill oil, and many other soils can be removed from ferrous metal stock or components by No. 5-S spray cleaner.

The material is a stable, free flowing, dustless powder that is readily soluble in cool or warm water. It has low foaming and good soil removal efficiency.

For further information, *write* Kelite Corp., 81 Industrial Rd., Berkeley Heights, N. J.

Material Handling Unit Has 500 lb Capacity

A MATERIAL handling container (Junior Palletainer Model 3220-SGC) has a hinged sidegate for quick, easy access when stacked. The unit is 32 in. long, 20 in. wide, and 16 in. high.

It's constructed of sturdy, electro-welded steel rod with 1⅛ in. mesh openings. The container has four fabricated steel stacking legs and is reinforced at all points of stress. All units are finished in a scuffproof baked aluminum paint.

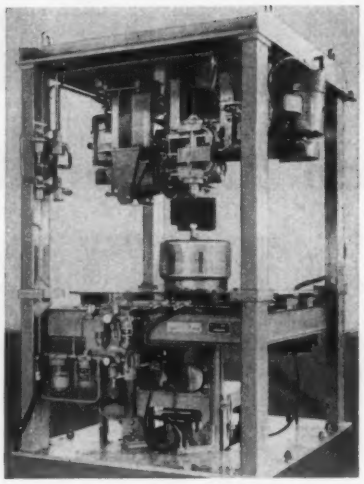
The container is rated at 500 lb capacity and is designed for the protected, simplified handling, storage, or transport of small parts and assemblies.

For further information, *write* Union Steel Products Co., Albion, Mich.

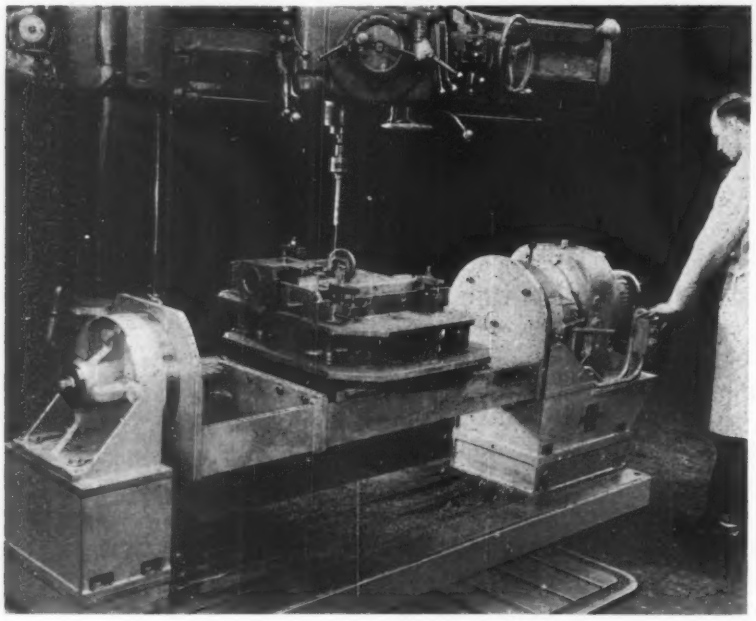
Deburring Machine Can Be Adapted to Automation

A MACHINE that automatically deburrs holes in such items as washer and dryer baskets in preparation for spray finishing has been developed by Murray-Way Corp.

With four wire brush heads, the machine will deburr a basket in a 10 second cycle. Three operations take place simultaneously: Two heads deburr holes on the outside of the basket; another head deburrs the holes in the bottom of the basket; and the fourth removes scale from the inside welded seam which holds the sides to the basket bottom. The machine can be used in an automatic production line.



For further information, *write* Murray-Way Corp., P. O. Box 180, Birmingham, Mich.



WITH THIS POWERED INDEXING POSITIONER, you can drill and bore accurately located holes on a production basis. The unit has 24 positive positions with an index tolerance (measured on OD of index plate) of 0.0025 in. maximum. It has a swing over subbase of 36 in. and a cradle width of 25 in. The positioner has a load capacity of 2000 lb (based on shear pins). The base measures 28 x 110 in. Cradle speed is 4 rpm. For further information, **write** Production Tool Div., Johnson & Bassett Inc., P. O. Box 1251, Worcester, Mass.

Welding Unit Uses Machine Screw Products as Studs

AN AUTOMATIC, high speed, studwelding machine with four station indexing enables simple machine screw products to be used as studs.

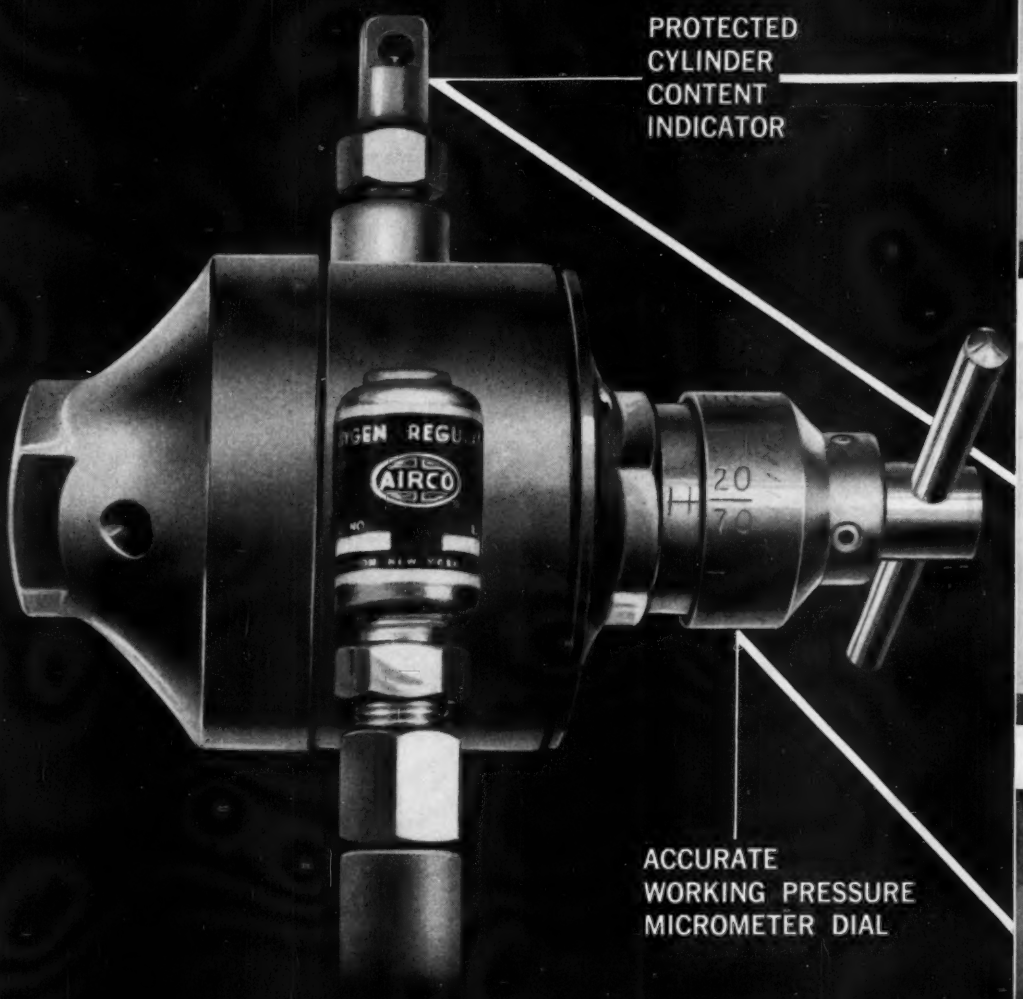
In one application, housings are loaded on an inclined rack, picked up by a set of expanding internal fingers, and transferred to the first station on the revolving table; the next station is idle.

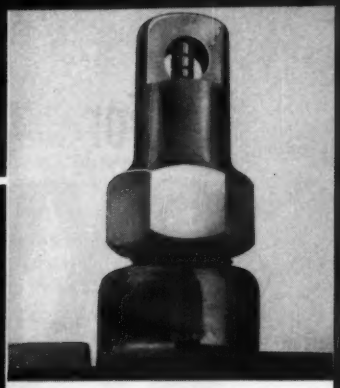
At station three, an operator loads studs into the two welding heads. As the housing is indexed under the heads, the operator pulls two safety handles and welds the studs to the inner surface of the housing. Station four is for ejection.

For further information, *write* Progressive Welder & Machine Co., 915 Oakland Ave., Pontiac, Mich.

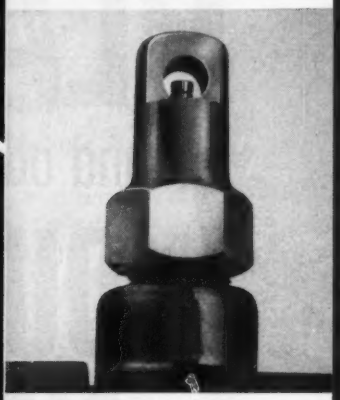
Control Unit Added to Vertical Turret Lathes

A MACHINE tool control called Size-Au-Trol brings cutting heads automatically to a stop when they reach preset positions during each

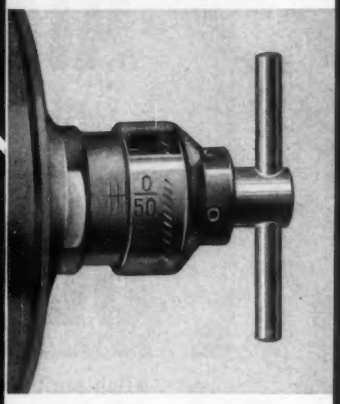




Indicator at top of protective housing indicates a full cylinder.



Cylinder content indicator at half-full position.



Read working pressure directly from micrometer markings engraved on dial. Regulators for oxygen and acetylene service are available.

All new...accurate...and toughest yet! Airco Gaugeless Regulators ...backed by the *most experience*

The new Airco Gaugeless Regulators for oxygen and acetylene give you the *pressure accuracy* you need, plus the *ruggedness* that regulators should have for construction and maintenance work, where rough handling is constant fare. That's because of the regulator's protected cylinder content indicator, and adjustable micrometer working pressure dial.

These rugged regulators are the newest in Airco's extensive quality line . . . two more examples of how *Airco experience* brings you better welding equipment. Whether you need regulators, gas welding and cutting equipment, tips, supplies or industrial gases – your nearby Authorized Airco Distributor has them in stock. Look in your Classified Telephone Directory, under "Welding Equipment and Supplies," for your nearest Authorized Airco Distributor.

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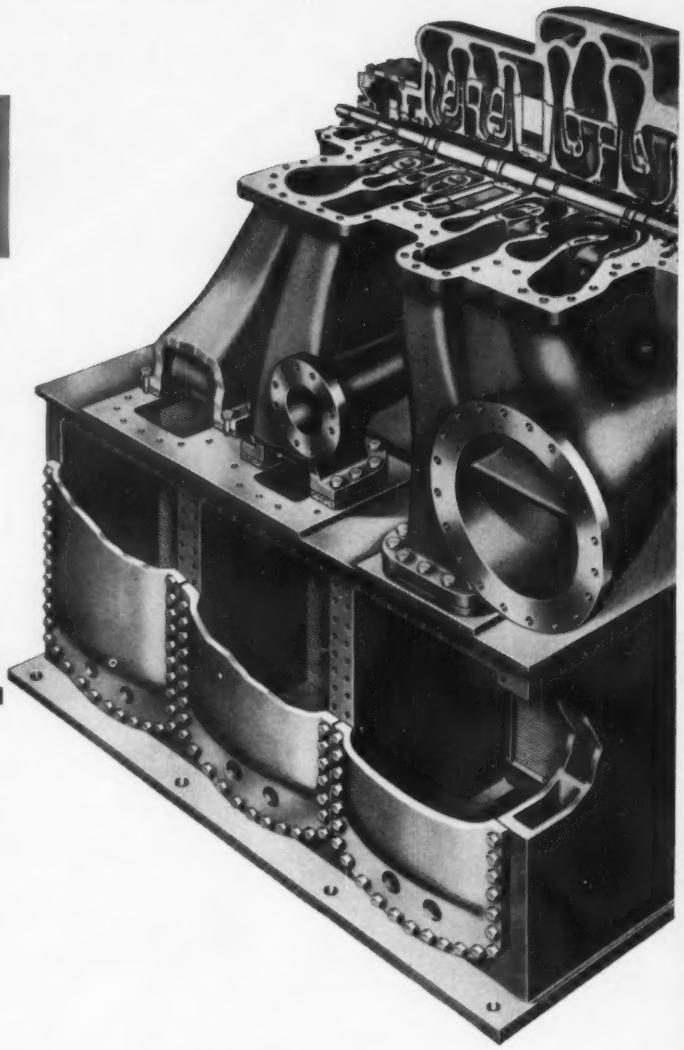
For OXYGEN PLANTS and other INDUSTRIAL AIR applications ...this new CLARK Centrifugal Compressor



High purity air is vitally important for the steel industry's new tonnage oxygen plants. While existing compressors could readily handle the service, economic considerations indicated the need for special high performance design.

The result is the new Clark Isotemp Centrifugal Air Compressor, a single case, four stage design possessing an unusually high hydraulic efficiency. To hold horsepower at a low level, the air stream is intercooled between each stage in base-mounted intercoolers. By mounting the compressors over the intercoolers, important savings in space requirements are realized. In addition to inherent compactness, the Clark design requires access to only one side for maintenance. The remaining three sides may be set flush against walls if required.

Another feature of the new Clark Isotemp Compressor is the use of back-to-back impellers to balance out thrust load. Integral bearing construction and single case design limit bearing and shaft sealing requirements to one at each end of the rotor and also eliminate alignment problems.

Being a simple rotative machine, normal maintenance consists of an occasional inspection. If ever necessary, however, the upper half of the case can be removed without disturbing bearings or breaking pipe connections.

In addition to providing primary air for oxygen plants, the Clark Isotemp Compressor is also an excellent choice for other industrial air uses requiring 110 psig air in capacities ranging from 5,000–38,000 cfm. They are ideal first stage compressors for wind tunnels or soot blowing because of their efficiency and air purity characteristics. The same advantages apply to base load, general industrial air applications where the complete absence of pulsation plus unusual compactness are also highly important features.

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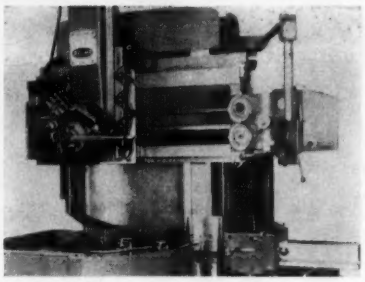


successive stage of an operation. It controls both horizontal and vertical head motions.

The control is standard on all Bullard Dynatrol vertical turret lathes. The device pares manual gaging operations, reduces time between cuts, and increases production efficiency of the machine.

After initial setup, head positioning is accurate to limits of 0.0003 in. in either axis. The size control can regulate internal boring, external turning, and internal and external facing. It's also suitable for blind holes which are difficult to reach for precise gaging.

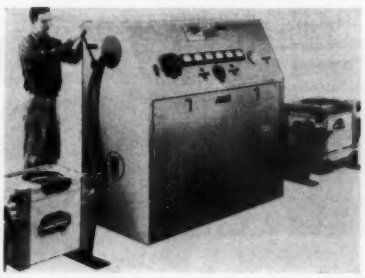
For further information, *write* Bullard Co., Canfield & Key Streets, Bridgeport 9, Conn.

Induction Melting Unit Is Rated at 1000 kw

SELF-contained power and control units for high frequency induction melting and heating have been developed by Inductotherm Corp.

The unit (Integral 100) is rated at 100 kilowatts and is motor-generator powered. The console is 72 in. wide, 35 in. deep, 66 in. high, and houses the entire power supply, capacitors, control, and safety devices necessary to operate one or two high frequency induction furnaces or coils.

It has an eight step auto transformer and 30 steps of capacitance values for meeting heating or melting requirements. Installation requirements: A 60 cycle, 440 volt power connection, a cold water connection, and a water drain. One or two coils or furnaces with capacities up to 500 lb may be connected directly to the unit by Inducto water cooled leads that contain conductors inside the water bearing hoses.

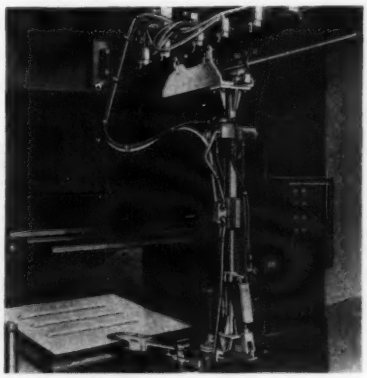


For further information, *write* Inductotherm Corp., 412 Illinois Ave., Delanco, N. J.

Press Extractor Has Inching Controls for Setup

A PRESS mounted extractor is self-contained and requires only one electrical interconnection with the press to start the grab and extraction cycle.

The press hand has manual inching controls mounted to the side of the press to facilitate setup. The unit has an adjustable vertical lift



cylinder which can be electrically switched in or out of circuit. Different grab jaws are available.

The unit is mounted on the back of a press with heavy duty hinge mounting brackets. A locking pin is removed and the unit swung aside to gain access to the die.

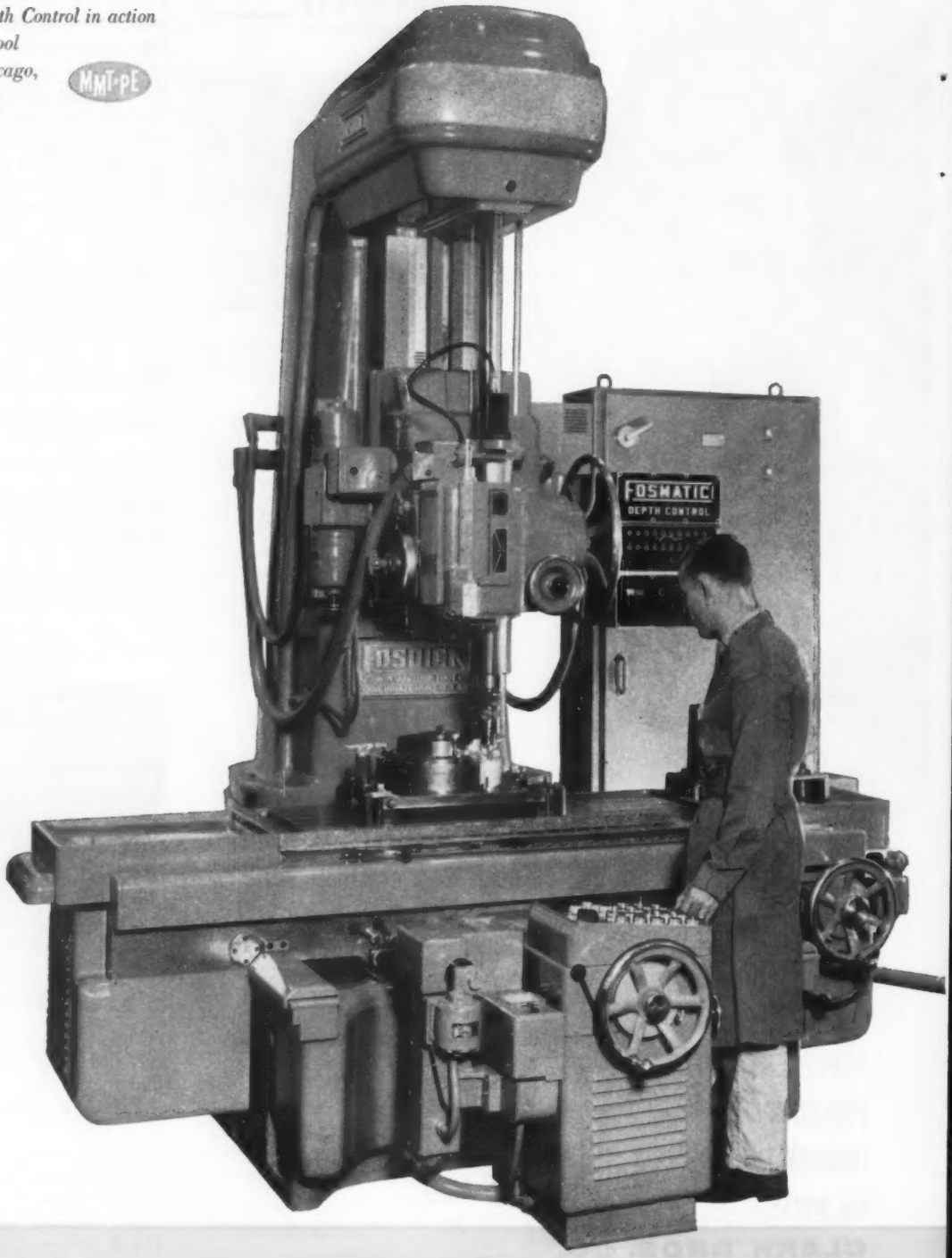
For further information, *write* Die & Automation Inc., 5353 Dixie Highway, Hamilton, Ohio.

Natural Gas Torch Cuts Heavy Sections

A NATURAL gas, cutting torch (Oxweld C-66) can slice through 30 in. of metal in a single pass. The torch has a gas flow up to 3000

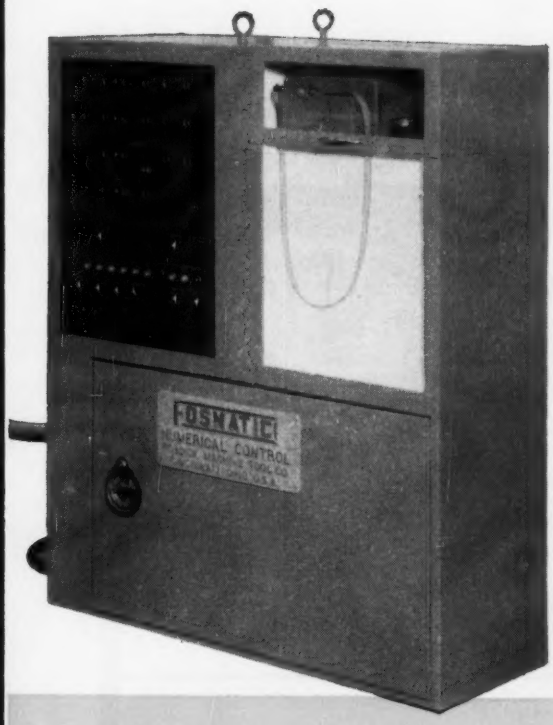
See Fosmatic Depth Control in action at the Machine Tool Exposition in Chicago, September 6—16.

MMT-PE



PRECISION

Numerical Control
in three directions



DEPTH CONTROL developed by Fosdick, adds the ultimate *third dimension* to precision boring. Use random length tools for boring to depth under complete numerical control. Combine rapid depth control with horizontal positioning, preselected spindle speeds and feeds, coolant on-off, tool selection, even automatic tool changing, all by Fosmatic Numerical Control.

Tape or dial any depth. Absolutely no stops to preset.

Fosmatic Numerical Control easily fits into a cabinet small as your home refrigerator. The Fosdick system is electromechanical. Its electrical components are simple, easily maintained.

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cfh of oxygen and 250 cfh of natural gas.

Interchangeable injectors make it possible to use the unit for low or medium pressure natural gas. A spring loaded injector assembly provides uniform and thorough mixing of gases and eliminates flashback.

More than 40 different Oxweld nozzles can be used with the unit including nozzles for scarfing, gouging, and rivet piercing. Bendable, long range nozzles can be ordered for riser cutting and for jobs in hard-to-get-at places.

The torch weighs 3 lb 14 oz. Standard models are 27¼ in. long with a 75 degree head angle. Longer and shorter models for special operations can be supplied with head angles of 45, 75, 90, and 180 degrees. The manufacturer says the unit is suited for manual cutting jobs in factories, foundries, steel mills, fabricating shops, and scrapyards.

For further information, *write* Linde Co., a division of Union Carbide Corp., 270 Park Ave., New York 17, N. Y.

Machine Tool Programs Drilling and Tapping

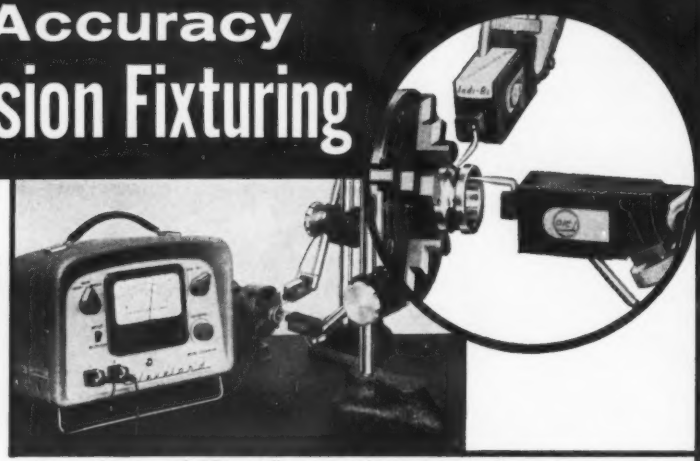
YOUR DRILLING, tapping, reaming, boring, and straight line milling operations can be controlled and programed by Hillyer's numerically controlled drilling machines. The unit permits spindle speeds, feed rates, and depth settings to be fully controlled by tape and dial along with conventional X and Y co-ordinates.

Jigs and fixtures are eliminated. Holes can be located and drilled to 0.001 in. per foot with production of up to 15 holes per minute on continuous, fully automatic operation.

The dial control panel and tape reader are mounted integrally with the machine. The tape reader uses a 4 in., direct reading, decimally coded plastic tape or a Flexowriter 1 in. paper tape. The direct reading

Millionths Accuracy
WITHOUT Precision Fixturing

using Cleveland Differential Gaging Systems



• Measurements to millionths of an inch accuracy are possible without the use of expensive high precision fixturing.

• Differential Gaging techniques greatly simplify the following measurements:

Concentricity	Cam Contour
Roundness	Parallelism
Size-Diameter	Squareness
Taper	Lead Screw Pitch
Flatness	Wall Thickness
Profile	and others

• Proper placement of differentially connected gage heads will cancel out fixturing, part, or environmental errors, such as:

Movement of part, work support or gage heads	Temperature variations
Deflection of part, work support or gage heads	Airfilm, Warpage
Errors in spindles or traverse mechanisms	Burrs
Wear of fixture or work support	

• Measurements can often be made under "impossible" conditions—in the production machine—using ordinary mechanical fixturing components—by unskilled personnel.

• Errors due to fixturing or environment 100 times greater than the desired accuracy can be cancelled out. For example: A spindle with .002 T.I.R. can be used to measure concentricity to 20 millionths of an inch accuracy.

• Simple—Inexpensive equipment consists of two identical gage heads and differential input amplifier.

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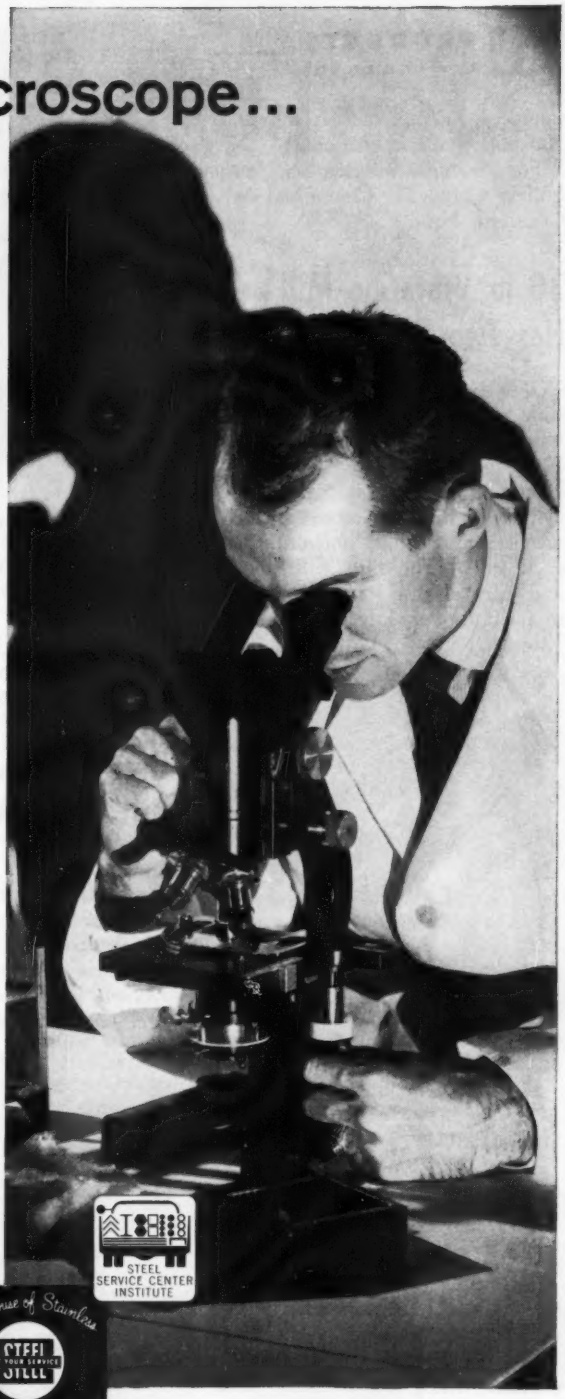

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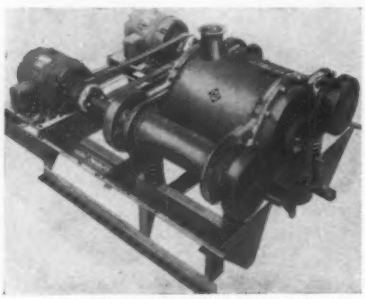
tape can be punched at a rate of 100 hole positions per hour.

For further information, *write* Hillyer Corp., 331 Centennial Ave., Cranford, N. J.

30 in. Vibrating Mill Has Two 50 hp Motors

CONTINUOUS processing is possible with the Allis-Chalmers 30 in. vibrating mill. It's powered by two 50 hp motors.

The unit has a spring mounted cylinder with dual, eccentric drive mechanisms running horizontally on each side. The mill with motors and integral base frame occupies 66 sq ft. It has an internal volume of 12 cu ft.



With this unit you can process such materials as alumina, asbestos ore, barite, blast furnace slag, copper ore, coke, and tungsten carbide.

For further information, *write* Allis-Chalmers Mfg. Co., 864 S. 70th St., Milwaukee 1, Wis.

Tilt Disc Sander Has Stationary Worktable

METALS, ceramics, plastics, or wood can be finished on the Yates-American 14 in. tilt disc sander. The unitized, tilting disc assembly (combining a direct motor drive, sanding disc, and safety guard) permits use of a stationary worktable.

Curved or irregular shaped workpieces can be finished by the wrap-around stationary table. It has a large, machined and ground work surface 20¾ in. wide with a 9½ in. edge to disc depth.

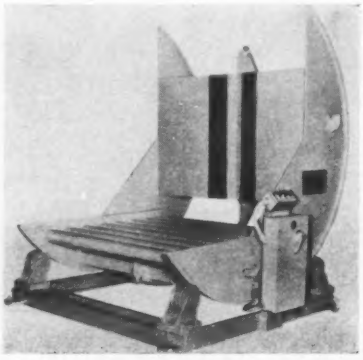
The disc can be tilted from 15 degrees forward to 45 degrees back with the handwheel located in front

of the machine. The sander is available with a ½ hp, ¾ hp, or 1 hp motor.

For further information, *write* Yates-American Machine Co., Beloit Wis.

Unit Positions Coils for Lift Truck Mandrel

COILED STRIP can be handled by the Roth Upender. The coil is slid off the truck onto the Upender, which turns the axis and places the coil in a vertical position. So, the coil can be moved by a bar or mandrel equipped lift truck or similar device.



The unit rotates the coil about its center of gravity and requires a minimum of electric power.

It's available in different sizes. You can get optional designs, including a base with 180 degree rotation.

For further information, *write* Roth Corp., Box 29, New London, Ohio.

Remarkable new tools benefit everyone!

The DoALL Company, Des Plaines, Illinois

This DoALL Announcement Also Appears in Newspapers

For several reasons we felt the news at right covering a substantial production breakthrough to be of such importance that the story should be presented in metropolitan newspapers.

We felt it our duty to remind the general public as well as people engaged in management and production of the fact that it is only through new and better tools that Americans can advance their standard of living. The *Super* saw bands developed for DoALL band machines are a bright new example of the basic truth: Economic and cultural progress comes directly through industry's application of the newest and best means to produce goods and services.

The average citizen needs a better understanding of how America's competitive enterprise system constantly supplies more of everything at lower costs by adopting the latest and fastest techniques. The DoALL Company pursues this policy through numerous additional efforts.*

***Typical DoALL Educational Projects**

"*Civilization Through Tools*"—our exhibit at the Museum of Science and Industry in Chicago—displays various types of basic tools and illustrates how living improves as a direct result of tool improvements during the Stone Age, Bronze Age, Iron Age and Machine Tool Age.

"*The Dawn of This Age*"—a second DoALL exhibit in Des Plaines, Illinois—dramatically explains how the manufacture and transportation of goods became the job of power-operated machines. An original James Watt steam engine and a model of the first machine tool are part of this exhibit.

"*The Story of the Cutting Edge*"—another touring exhibit on the evolution of metalworking. This is accompanied by a lecture on modern cutting tools and is illustrated with color slides.

"*The Story of Measurement*"—a further dramatic exhibit—shows the evolution of precision measurement. Technical material is available on modern quality control techniques.

Numerous study charts on the Machine Age are available for schools and industry by writing The DoALL Company, Des Plaines, Illinois.

Remarkable new tools benefit everyone!

This announcement of a galaxy of new *Super* DoALL band saw blades has unique importance for everyone. With much higher cutting performance and at lower costs, these new *Super* DoALL band tools generate another breakthrough for productivity and consequent higher living standards.

There are several types of new *Super* DoALL band tools. One of these is like a thin, endless broach—with insert tool points—ground on all cutting faces, which can be resharpened several times. Total life is many times longer than any previous band tool. Others have special multi-heat treatment processing which assures more accurate cutting with enormous increase in cutting productivity.

This new set of *Super* DoALL blades, added to the previous 18 styles of tools built for band machines, offers industry tremendous prospects for cutting manufacturing costs on a wide variety of products.

Three case histories reflect why "Each year the economy of the U. S. has been able to increase an average of more than 5% —more goods, for more people, at lower costs."

1. Take tractor parts; formerly cut with a hack saw, they cost $3.17 each. The factory plows back part of its earnings to buy an automatic DoALL Power Saw. The tractor parts then cost only $1.90 each. The end result: More food production for less money for everyone.

2. Manufacturing costs of wheel brakes for new jet airplanes were reduced by using a DoALL Band Mill, thus freeing more expensive machine tools for other jobs. This new method of manufacture results in enormous savings which help reduce air fares and thus make air travel possible for more people.

3. New miniature radios use transistors that were once prohibitive in cost. Then DoALL introduced new machine tools to precision slice wafer-thin the fragile semiconductor materials and with other developments the price of diodes and transistors dropped from $100 to as low as 50¢ each.

Multiply these examples a thousand times in thousands of factories and you have the reason for America's spiraling wealth which is the envy of the world.

DoALL is proud of its collaboration with industry — creating implements that increase productivity. When this company introduced the band saw as a machine tool, industry gained new concepts for lower cost manufacturing. Now any solid substance can be sliced directly to shape and dimension instead of chipping away the excess material. This new concept of continuous cutting with a narrow band tool also opens wide frontiers for machining new "exotic" materials.

While most manufacturers are already familiar with earlier DoALL machines and tools, new developments emerging from our Research and Development have raised production to astonishing new heights. Investigate these new production levels that are now possible with newest DoALL machines and tools. Factory-trained experts will demonstrate if you write or call.

SB-84

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The DoALL Company, Des Plaines, Illinois

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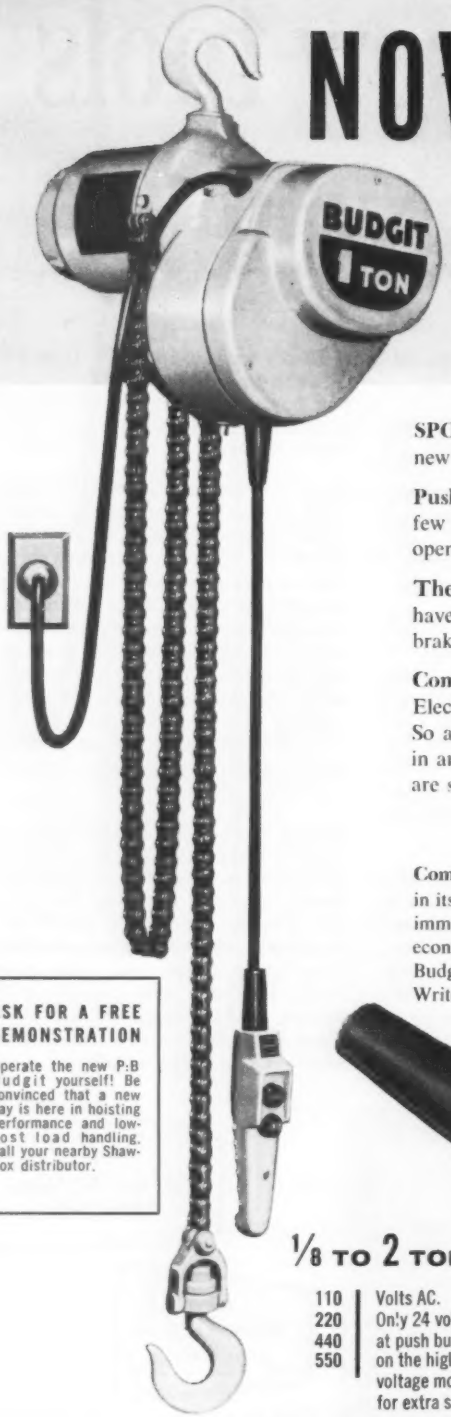
"FRACTURES FRACTIONS"



SPOTTING speed and accuracy are "right on the button" with this new Push Button Budgit Electric Hoist.

Push button action is so sensitive you can spot loads precisely in a few ticks of time. The control station fits the palm for one-hand operation, leaving the other hand free to guide the load.

The P:B Budgit has two automatic brakes. Heavy-capacity cranes have the same type of load brake. It's the only hoist with mechanical brake built into the motor. Each brake alone can hold the load.

Compartmented components add still more value to the P:B Budgit Electric Hoist. All electricals are enclosed, safe from dirt and moisture. So are the motor and motor brake. Gearing and load brake operate in an oil bath, sealed against airborne substances. Maintenance needs are simple as can be.

SEE BULLETIN FOR DETAILS

Compare the new P:B Budgit Hoist with any other electric in its class. It's a portable hoist you hang up, plug in, and use immediately with top efficiency, safety, convenience, and economy. Get full details, plus data on pull cord operated Budgit Hoists in AC, DC, and 12-volt battery powered models. Write for Bulletin 15010-15C today.

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NEW literature

Write directly to the company for a copy

Explosive Forming

Technical Bulletin No. 4 describes a method of shaping metal parts by explosive energy. The bulletin covers materials, applications, and advantages. Propellex Chemical Div., Chromalloy Corp., P. O. Box 187, Edwardsville, Ill.

Abrasive Compounds

A 4 page bulletin, "Abrasive Compounds in Barrel Finishing," discusses deburring action required in specific applications, and selection of abrasives. Also covered: Nonabrasive chemical blends used with abrasive media to prevent chemical attack (and provide better cleaning action) and those in which an abrasive material is combined with the particular chemical blend. Frederick Gumm Chemical Co. Inc., 538 Forest St., Kearny, N. J.

Arcwelding Guide

An 80 page booklet, "Vest Pocket Guide to Better Welds," describes five essentials for proper welding, welding positions, operator qualifications, and electrode cost data. Hobart Bros. Co., Troy, Ohio.

Magnetic Shielding

A 16 page bulletin (F-1) gives precise design and performance efficiency data of magnetic alloy shields for high gain input transformers and electron beam tubes. Magnetic Metals Co., Hayes Avenue at 21st Street, Camden 1, N. J.

Arcwelding Torch Manual

A new instruction manual describes the operation and use of the carbon arcwelding process. It discusses many industrial applications. Arcair Co., P. O. Box 431, Lancaster, Ohio.

Pocket Slide Calculators

Two companion slide calculators permit several readings to be obtained quickly. One, the Carb-A-Guide, indicates machinability ratings, grade of carbide to be used, and surface speed for various ranges of feed and depth of cut. The other, a multipurpose calculator, provides technical data on hardness conversion, speed conversion, milling feed rates, and horsepower. Adamas Carbide Corp, Kenilworth, N. J.

Epoxies in the Foundry

Ten applications offering savings of up to 60 per cent are outlined in an 8-page brochure. The applications include blow coreboxes, loose pieces, spotting slugs, match plates, core sticks, cope and drag patterns, fillet pastes, and pattern coating resins. Furane Plastics Inc., 4516 Brazil St., Los Angeles 39, Calif.

NEW BOOKS

Cathodic Protection, J. H. Morgan, MacMillan Co., 60 Fifth Ave., New York 11, N. Y., 325 pages, $12

Application of cathodic protection to initial design of structures is discussed. Techniques employed with cathodic protection are emphasized. The subject is divided into two parts: The technique and the means of obtaining protection on a variety of structures. Instruments for cathodic protection are also covered.

Welding Nuclear Power Piping, published by the American Welding Society, Dept. T, 33 W. 39th St., New York 18, N. Y., 20 pages, $1.50

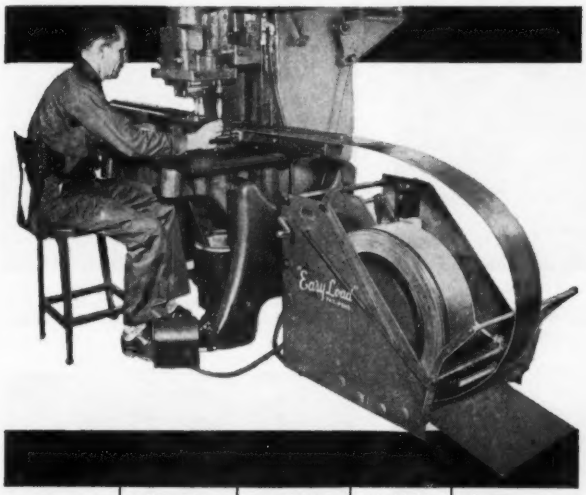
Welding of various materials for nuclear power piping operations is discussed in this report. The material includes welding procedures, detailed operation sketches, joint design, angles and dimensions, quality control, qualification of procedures, welder qualifications, and inspection methods.

Filler Metal Comparison Charts, published by the American Welding Society, Dept. T, 33 W. 39th St., New York 18, N. Y., 48 pages, $2.50.

The brand names of 78 companies are listed in the welding rod and electrode comparison chart. Fifteen AWS-ASTM specifications are involved. Brands and manufacturers' names are in two indexes.

reduce set-up time and lower production costs

WITH ROWE 800 SERIES *"Easy Load"* COIL CRADLES



MODEL	MAXIMUM CAPACITY WEIGHT	MAXIMUM WIDTH CAPACITY	MAXIMUM O.D. CAPACITY	FLOOR SPACE REQUIRED
810	1200#	10"	36"	15" x 30"
815	1200#	15"	36"	20" x 30"
820	1200#	20"	36"	25" x 30"
824	1200#	24"	36"	29" x 30"

When you are *in production* with ROWE "Easy Load" Coil Cradles, you are getting precision coil handling that reduces your set-up time and cuts your costs. Instant coil positioning by means of the adjustable side guide plus positive feeding action puts most materials exactly where it should be without underfeeding or overrunning. All 800 Series "Easy Load" Cradles can be moved from station to station by one man quickly and easily. They work equally well with manual or automatic feeding arrangements. Reduced-friction side guides pay off the coil without binding or scratching.

If you use coil stock for production items, the Rowe "Easy Load" 800 Series Cradle can increase the accuracy, efficiency and economy of your operation.

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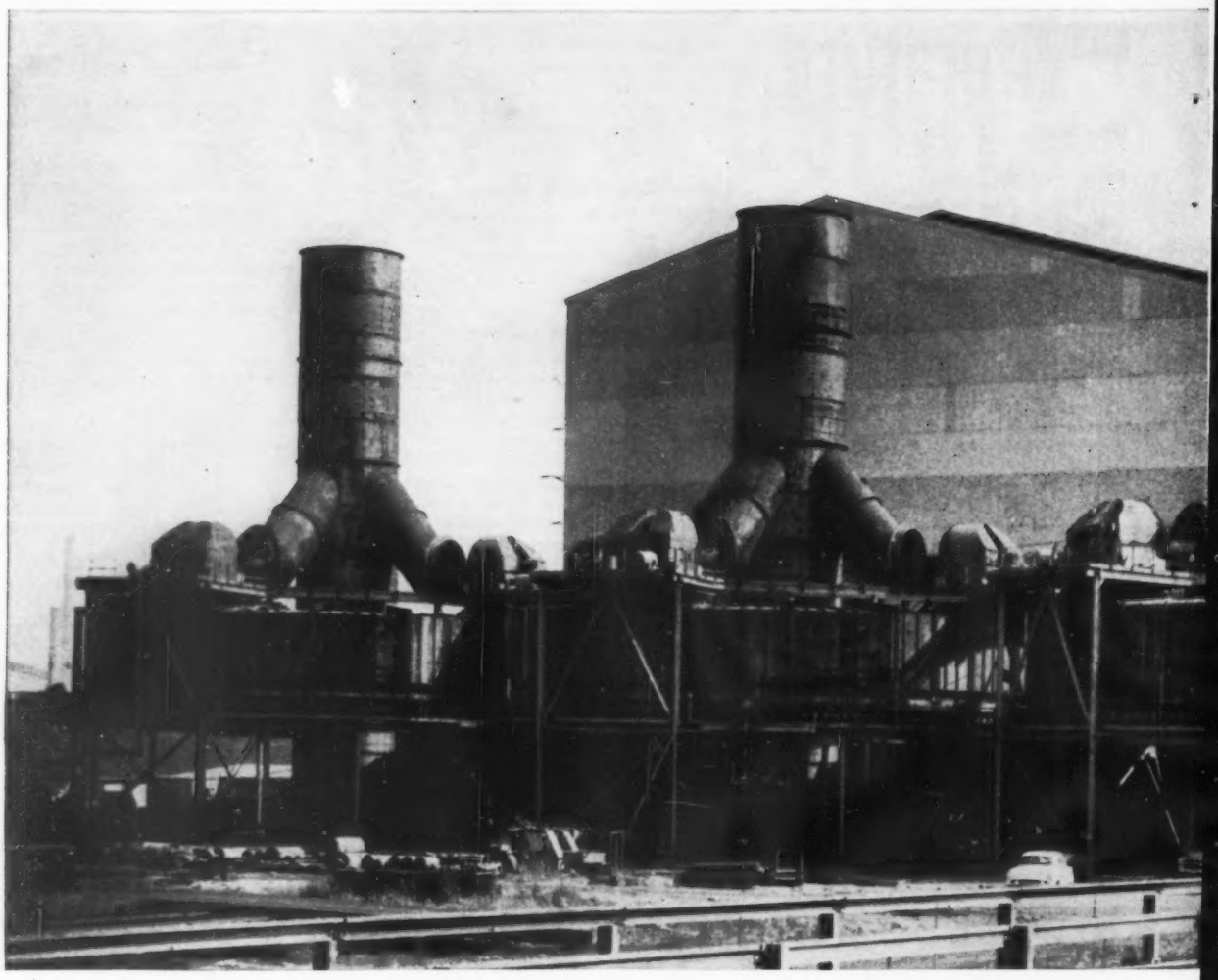
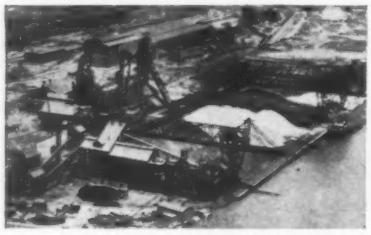
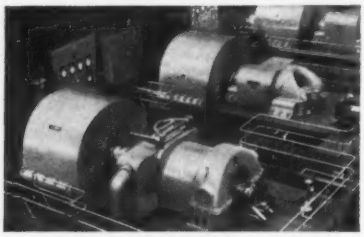


One of two 15,000 ton per day Dravo-Lurgi sinter plants. Each plant contains three sinter machines, and is rated among the largest in the world.

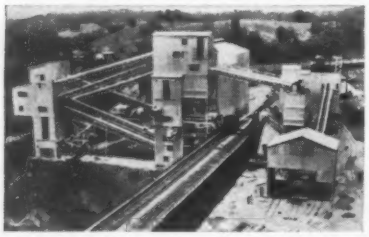


Dravo-Lurgi sinter plant, ore bridges, dock, boiler plant, pump house and waste treatment facilities are included in engineering-construction for this mid-west steel mill.

Dravo-built power plant produces electric power and high pressure steam for mill supply. Contract included piping steam and blast furnace gas to and from the plant.

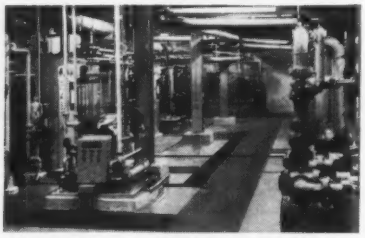


Part of a Dravo power plant project, these three DeLaval turbo-blowers produce 290,000 cfm of standard air for a major steel company's blast furnaces.

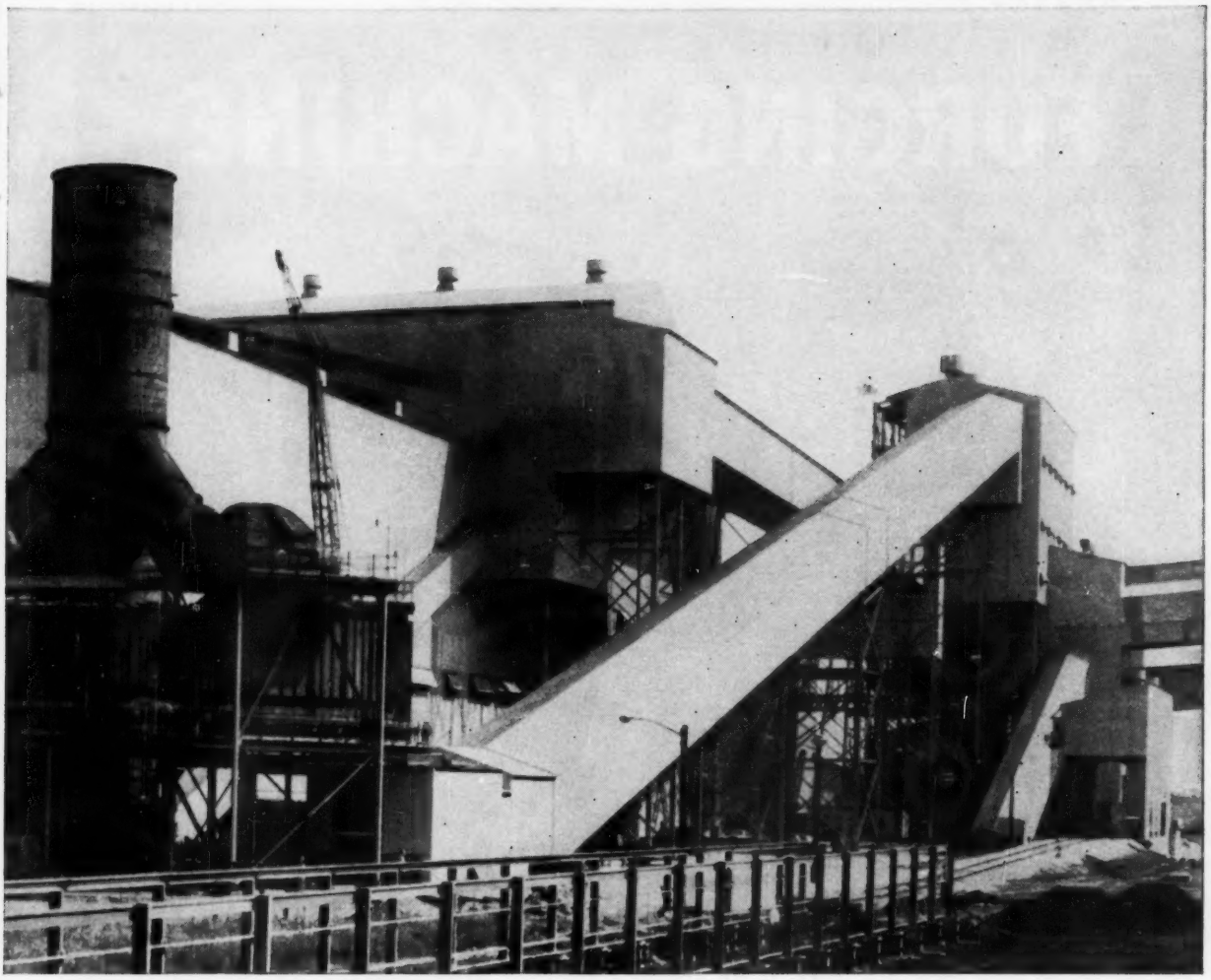


A 2400 ton per day Dravo-Lurgi sinter plant constructed by Dravo. Materials handling system is designed to receive and store a day's supply of raw materials in eight hours.

Blast furnace flue dust recovery plant includes two 105-foot Walker Process Thickeners. Other Dravo projects include pumping stations, water treatment and waste disposal plants.



Automatic Dravo-DeLaval mill lubrication system, circulating a total of 45,200 gallons of oil at 556 gpm, protects one of the world's fastest 10-inch rod mills.



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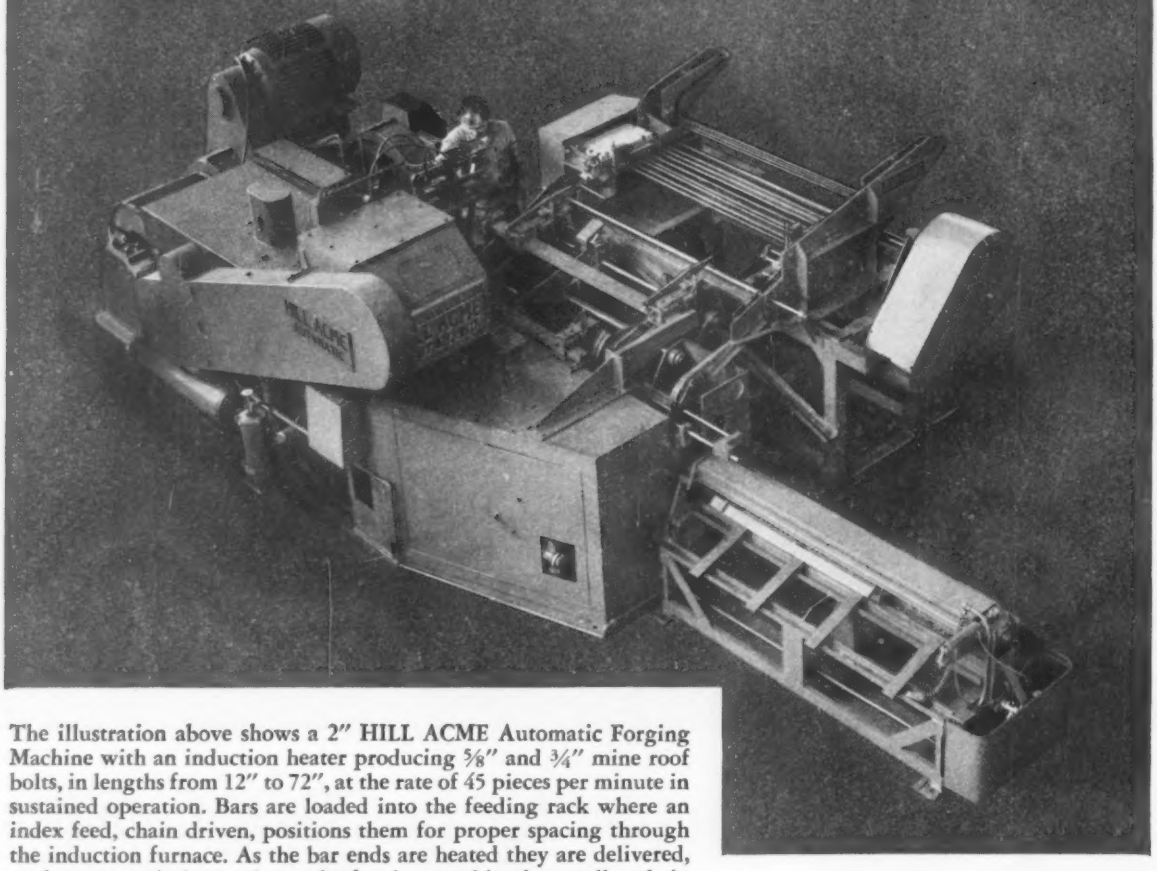

The illustration above shows a 2" HILL ACME Automatic Forging Machine with an induction heater producing 5/8" and 3/4" mine roof bolts, in lengths from 12" to 72", at the rate of 45 pieces per minute in sustained operation. Bars are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace. As the bar ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the dies. Finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

The design of this new HILL ACME AUTOMATIC forging unit does not limit the number of passes or the length of stock to be used in forging a variety of parts. Pieces longer than 36" are supported by a walking beam through the various passes.

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Production May Drop to 60%

LOOK for steelmaking operations to fall into the low sixties by the end of June and to hit bottom for the year—about 60 per cent of capacity—in the holiday week of July 4.

Last week's cutback of 4.4 points was the second sharpest of the year—exceeded only by the Easter week curtailment of 6.7 points. Last week's production—about 1.9 million ingot tons—was equivalent to 66.9 per cent of capacity.

IN LINE WITH '59—During May, operations averaged 71.5 per cent of capacity (vs. 80 per cent in April). Production was about 9 million ingot tons, bringing total output for the first five months to 53.5 million tons. During the corresponding period last year, production was almost identical: 53.4 million.

NO UPTURN IN SIGHT—In the last few days, steelmakers in Chicago and Pittsburgh have seen a slight improvement in bookings, but they're quick to point out that there's no real evidence of an upturn. On "good" days, orders come in at a rate that would justify making steel at 45 to 50 per cent of capacity. On bad days, there's barely enough business in view to support 35 per cent operations. Understandably, sales executives don't get too excited when they contemplate jumping from a low, low level to one that is merely subpar.

TONNAGE PILING UP—In the East, orders are still declining as users live off their inventories. Cancellations are negligible, but requests for deferred shipment are still being received—and they're getting to be a serious problem. Even in cold rolled sheets, which have been in better demand than most products, tonnage is piling up behind the finishing mills to a point where it's affecting the efficiency of operations. Some tonnage has been held since March.

THREE CHEERS FOR JULY—A spokesman for a major Midwestern mill sees three reasons for anticipating a mid-July upturn in steel orders: 1. By that time, excess inventories in customers' plants will be depleted. 2. Some vacation periods will be over, and plants that put off ordering before vacation shutdowns will be back in business. 3. Automakers will start ordering for their 1961 models, and they'll want big enough tonnages so that they can produce enough cars to supply all of their dealers before the September introductions.

LIQUIDATION CONTINUES—Although they'll readily agree the July should bring an upturn in orders, market analysts are beginning to wonder whether "excess inventories" will be depleted that soon. Liquidation started in May after a five month poststrike buildup. Traditionally, "down" cycles last as long as "up" cycles, so it will be something of a phenomenon if the current trend is reversed before the fourth quarter. Some analysts see liquidation continuing into 1961.

OIL COMPANIES TRIM STOCKS—With two years of labor peace assured and surplus tube-making capacity in the industry, major oil companies are departing from their traditional inventory policies. They used to carry a six month steel supply in normal times and an eight or nine month stock whenever there was a strike threat. But with the 1959-60 labor crisis behind them, they're carrying liquidation farther than expected

Since downriver stocks are completely rebuilt, steelmakers have no place to ship their tubing, casing, and drill pipe. Reasons: 1. Drilling activity remains low—worse, on the average, than in 1958. 2. Users have ample inventories and are dead set against increasing them.

WHERE TO FIND MARKETS & PRICES

	News	Prices		News	Prices
Bars, Merchant	109	113	Nonferrous Met.	128	130
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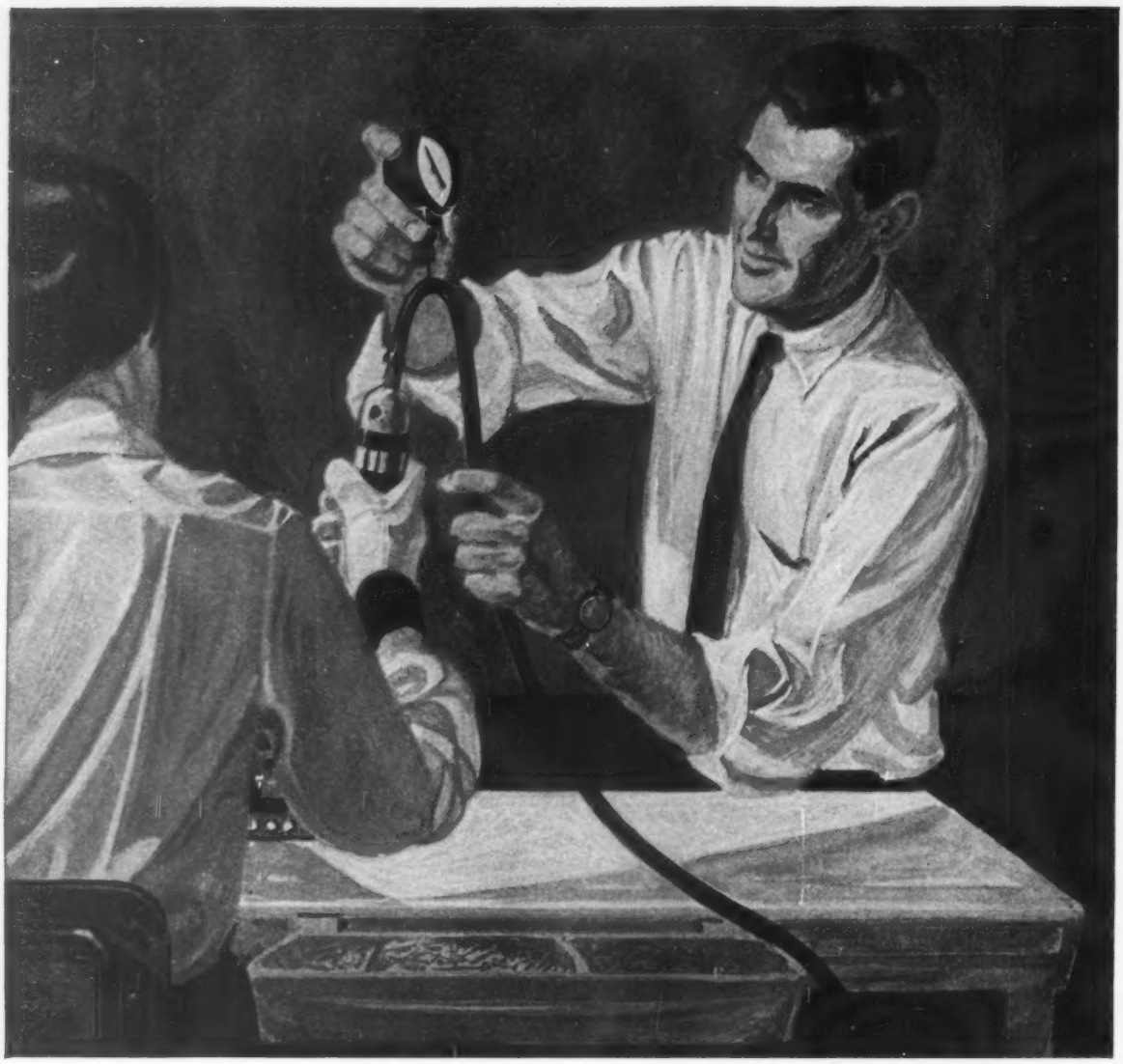
*Current prices were published in the May 23 issue and will appear in subsequent issues.



He detects low-pressure air power

A pressure drop between air compressor and air tools *steals power dollars* like a thief in the night. Each tool slows down a little; each piece of pneumatic equipment loses some of its power. Although the slowdown may grow undetected, *plant efficiency suffers.*

A Gardner-Denver Compressed Air Specialist is an expert at diagnosing off-pressure air power. Dedicated to keeping compressed air systems at peak efficiency, he often prescribes simple remedies which restore normal air pressure without adding a new compressor. He will suggest a test for air leaks, and a search for fouled, undersized or extended air lines. He may recommend a schedule of preventive maintenance.

If he should find that the need is for a larger compressed air supply, he may recommend additional compressor capacity from Gardner-Denver's complete line. For a compressed air check-up in your plant, call your nearest Gardner-Denver branch.

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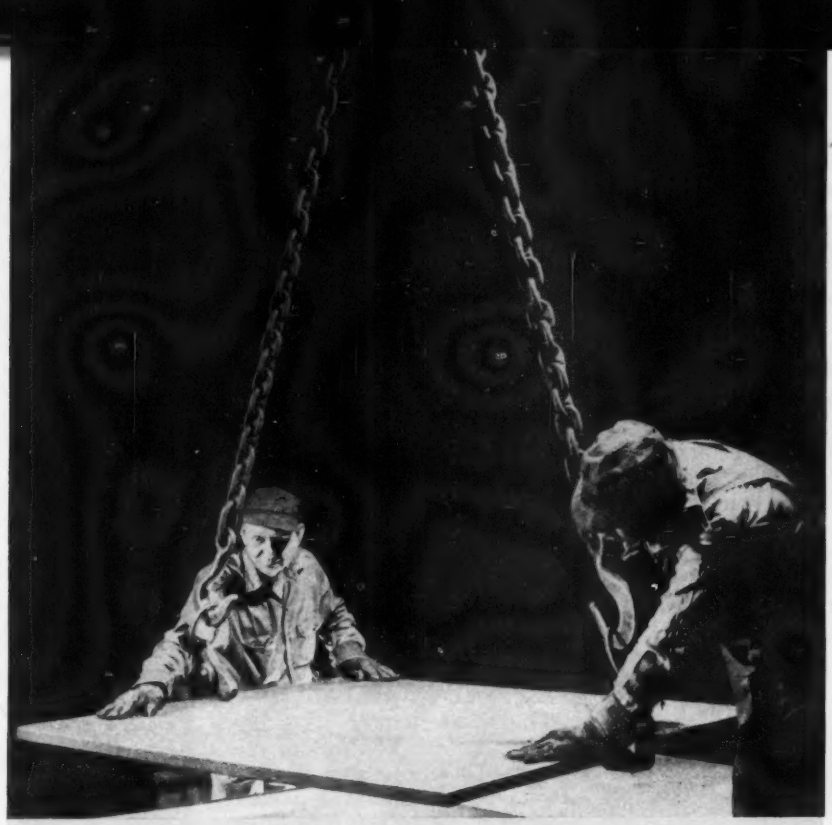

PLATE SHIPMENTS (net tons)

(Leading buyer categories, plus total all categories)

Categories	1959	1958	1957	1956	1955
Construction & Maintenance	1,431,578	1,588,785	2,375,120	1,811,280	1,744,611
Machinery, Industrial Equipment & Tools	1,094,598	840,391	1,475,977	1,448,254	1,311,427
Service Centers	880,384	639,483	1,382,800	1,365,053	1,005,743
Rail Transportation	543,177	302,661	1,046,433	942,398	637,926
Shipbuilding	464,781	596,842	913,938	531,485	391,570
Automotive	341,755	239,287	353,845	418,858	528,387
All Others	1,062,883	1,078,971	1,690,512	1,197,295	1,142,594
Totals	5,819,156	5,286,420	9,248,625	7,714,623	6,762,258

Source: American Iron & Steel Institute.

1960: A Better Year for Steel Plates

PLATE business this year will probably exceed 1959's, but it'll fall short of breaking any records.

First half business will lag behind that of the corresponding period of 1959 when strike hedge buying pushed shipments to about 4 million tons—within 1.3 million tons of total shipments for the year.

Shipments this half will probably be in the vicinity of 3.5 million tons, and business, to date, has been disappointing. Mill operations throughout the remainder of the half are expected to be at a fair, though slackening, pace.

The lull is expected to carry through the summer months, especially July. Much depends upon what happens in the fall.

• **Fabrication Down**—So far this year, fabrication has not been up to expectations, and the inventory buildup was faster than anticipated.

Construction (particularly industrial work), machinery, and heavy industrial equipment (major consumer categories) got off to a wobbly start this year, and as inventories came into balance, jobbers

eased pressure for plates.

• **Little Help Here** — The shipbuilding industry is a heavy buyer of plates (in relation to other products) when its business is up, but the industry shows little promise this year.

The strike at the eight Eastern shipyards of Bethlehem Steel Co. is in its fourth month. It has tied up $500 million in Naval construction and about $120 million in commercial shipbuilding. It is doubtful that replacement tonnage by government subsidized commercial lines will involve orders for more than 14 or 15 vessels this year (against 19 last year, 22 the year before). Aside from some submarines, there is little outstanding Navy work.

• **Weak Markets**—Some line pipe fabricating facilities are down because they lack work. Railroad equipment requirements are spotty. Demand from the oil and chemical industries lacks buoyancy.

• **Expansion Programs** — Capacity is still being built up with an eye to the future. In 1957, sheared plate capacity amounted to 7,917,000 tons annually; universal plate, 1,310,500 tons. Today, it is estimated that sheared plate capacity runs close to 9.7 million tons. Changes in universal plate capacity have been minor.

On the West Coast, Kaiser Steel Corp. has completed a program which provides a capacity of 511,200 tons of sheared plates (vs. 163,000 tons three years ago) and 16,100 tons of universal plates (vs. 15,000 tons three years ago).

United States Steel Corp. has authorized a combination 160 in. and 210 in. wide plate mill in the Chicago area. It will replace a mill built during World War I. The mill will turn out extremely wide plates weighing as much as 30 tons each.

Alan Wood Steel Co., Conshohocken, Pa., will have a new mill in operation a year from this summer which will roll plates up to 96 in. wide and 4 in. thick. It will replace the present plate mill. Unofficial estimate of capacity (with present melting facilities): 300,000 tons of sheared plates annually vs. 183,000 tons now.

Lukens Steel Co., Coatesville, Pa., completed the final phase of its $33 million expansion last year when a 140 in. slabbing mill was put into operation. Bethlehem Steel Co. expanded its plate capacity last year through improvements to its 134 in. plate mill at Johnstown, Pa.

• **Alloy, Stainless Up**—Slight gains are being made in the production of alloy and stainless steel plates. Last year, alloys (not including stainless) accounted for 170,634 tons, stainless 35,853 tons. The total: 206,487 tons, or 3.6 per cent of all plate shipments (5,819,156 tons). In 1957, the banner postwar year for plates, the ratio was 3 per cent.

Plates . . .

Plate Prices, Page 113

Improved demand for plates the last week or so is reported in the Midwest, but sellers say it's too early to tell whether it is part of the normal pattern of fluctuating orders, or whether it portends a pickup in activity by plate users.

In any case, the situation in the Midwest is not being duplicated elsewhere. In the East, plate deliveries continue to ease. Some mills can now turn out tonnage against new orders within ten days, and promises within two to three weeks are common. Cutbacks continue, and producers look for little upturn in business before midsummer. Alloy plate deliveries range five to six weeks, with a moderately good volume of orders being placed by the chemical industry.

Tank fabricators are scrambling for orders and complaining about the low prices that are being bid. One of the larger firms in the Pittsburgh area has a three month backlog but says that's only half the normal size. "We're still working a five day week with two shifts in some departments," a production official comments, "but we're getting a little bit apprehensive about the second half. Business shows no signs of picking up."

Confident they can get four to five week delivery of almost anything they may need, fabricators are living off their steel inventories —buying only what they need for specific jobs. They can demand and get promises from distant mills that new orders for sheared plates will be delivered within ten days.

Although the market is highly competitive, fabricators say steel suppliers aren't cutting prices. During the strike, brokers offered foreign plates at prices substantially below domestic mill quotations but got few takers because their specifications weren't satisfactory. The plates they offered were often too small. Now they're out of the market entirely.

The city of Seattle has called for bids June 1 for Schedule 6, Tolt River supply line, involving 1400 tons of plates.

Heads Distributors

WAYNE RISING

Officers of the Steel Service Center Institute elected at the annual meeting in Miami, Fla., are: President, Wayne Rising, vice president, Ducommun Metals & Supply Co., Los Angeles; executive committee chairman, C. L. Hardy, president, Joseph T. Ryerson & Son Inc., Chicago; executive vice president and secretary, Robert G. Welch; vice president, J. J. Hill III, vice president, Hill-Chase & Co., Philadelphia; vice president, Pollard Turman, J. M. Tull Metal & Supply Co., Atlanta; treasurer, Ralph W. Shaw Jr., president, A. R. Purdy Co., Lyndhurst, N. J.

Distributors . . .

Prices, Page 121

Steel service centers report a slight tapering in business. Most distributors believe that May volume will be smaller than the April

bookings and that the decline will continue through June.

Stocks are in excellent shape in all classifications. Even inquiries for nonstock items can be filled within normal leadtimes by distributors' suppliers.

Distributors in the Southwest are placing third quarter orders with domestic and foreign mills. There are indications that the failure of the Summit Conference is a factor in the move to replenish and increase inventories in that area.

Following the lead of Joseph T. Ryerson & Son Inc., other distributors in the Seattle district have adopted the Pittsburgh pricing pattern. New prices that went into effect three weeks ago in the Los Angeles area are stimulating business there.

Wire . . .

Wire Prices, Pages 115 & 119

Slack demand for wire products of all kinds is reflected in the easy deliveries on both manufacturers and merchant grades. Manufacturers' wire is available for shipment within a month, while merchant products can be had within a week to two weeks and in some cases from stock.

Steel Bars . . .

Bar Prices, Page 113

Although it's diversified, demand for hot rolled carbon bars remains slow. Some consumers are still deferring shipments. Deliveries range two to four weeks, and little inquiry for the third quarter has yet developed.

May production of hot rolled dropped sharply below that of April. Leading producers had a considerable amount of carryover tonnage from the first quarter on their books in April. They operated at about 80 per cent of capacity during the month, even though new bookings were continually declining.

In May, backlogs all but vanished, forcing barmakers to gear their production to order entry. Result: Output fell 20 points, to 60 per cent of capacity. Judging from what is on the books or in prospect for June, this month's operations won't exceed 50 per cent.

It's the consensus that there will be no pickup in demand for hot rolled bars until users digest their large inventories, and that may not happen until the end of the third quarter.

Cold bar finishers are overstocked with hot bar stock and have all but withdrawn from the market; they've received big cancellations from some customers and less business than they had expected from others. With steel coming in to them faster than it has been going out, their storage facilities are taxed to the limit.

Automakers are buying only on a fill-in basis. They have about all the steel they'll need to wind up production of their 1960 model cars and probably won't start ordering in volume for next year's models until late July.

Aside from some grade and size imbalances, service centers are well stocked. Almost all users are concerned about high interest rates and are likely to depend on the distributors for supplies to a greater extent than formerly.

Except for die-rolled bars re-

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quired for small arms, demand for steel bars is slack in New England. Contracts for M-14 rifles in the district total about $7.4 million. New equipment is required by Worcester, Mass., and New Haven, Conn., to meet their contractural commitments —a factor that's holding back some steel procurement. Other carbon bar users are buying hand to mouth, frequently placing orders with the mill promising the quickest delivery.

Hercules Drawn Steel Corp., Toledo, Ohio, is operating a new drawbench at its 30,000 sq ft plant in Detroit. The new equipment permits the producer of cold drawn steel bars to extend its product size range to 3.5 in. in diameter.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 114 & 115

Sheetmakers say order cancellations have stopped, but they're still receiving requests for shipment deferments. Some report so much tonnage piled up beyond the finishing mills they are having difficulty operating efficiently. The deferments are enabling buyers to obtain quick deliveries.

Hot rolled can now be had within two to three weeks, and cold rolled within five to six weeks. Galvanized sheets are also in easier supply because of spot openings in rolling schedules.

New orders continue to decline as consumers' needs taper off and inventory liquidation is pressed on all sides. The slide in orders and deferred shipments are being reflected in a lowering of production. The decline is expected to continue through July because of hot weather and vacation interruptions. Some time during the summer, however, it's thought that a definite upturn in demand will develop—probably in August.

With the third quarter only a month away, an increasing number of orders is being entered for shipment early in that period. However, producers can still enter tonnage for June shipment in most steel products.

Collapse of the Summit Conference in Paris and worsening relations with Soviet Russia are expected to tighten defense requirements. However, short of some new and highly explosive development, it's not expected that consumer buying policy will change much over the foreseeable future.

The earliest pickup in demand is expected about mid-July when the auto builders are likely to start placing orders for 1961 models. The mills have orders for pilot runs, but the tonnage is too small to make much difference in operations. At present, the auto companies are buying only for day-to-day production needs.

Steel Drum Shipments in February Show Decline

Shipments of steel shipping barrels and drums in February amounted to 2,132,035 units, 10 per cent below January shipments, reports the U. S. Census Bureau. Cumulative shipments for the first two months of this year were 4,762,332 units vs. 5,152,936 in the like 1959 period.

February shipments of 5,124,892 pails were down 6 per cent from the January total and about 6 per cent from the movement in February a year ago. The total for the first two months of the year was 10,555,303 pails vs. 10,489,377 in the same 1959 period.

Cold War Spurs Stronger Southwest Steel Demand

Intensification of the cold war is reported adding impetus to steel stockpiling in the Southwest. The renewed interest of consumers is reported reaching domestic and foreign mills.

Sales representatives of French and Belgian mills are telling their customers that they do not expect any further easing of foreign steel prices. Many buyers, who have been awaiting lower quotations, are reported placing orders for August delivery.

Users' inventories have been shrinking steadily in recent weeks. The slowdown in buying during second quarter is thought bound to result in a strong third quarter demand. The extent of the pickup, it's said, will depend on whether current excess stocks of imported steel can be absorbed. Incoming foreign tonnage is expected to decline in May, June, and July.

Structural Shapes . . .

Structural Shape Prices, Page 113

Inquiry for structural steel is a little better than it was, but demand is spotty, small jobs dominating the market. Fabricators generally report shrinking order backlogs. Some medium sized shops have little business entered for shipment beyond July.

Bidding on fabricated work is so competitive in the Pittsburgh area that many firms say jobs aren't worth getting at the prices they would have to quote. "We're not buying any more steel for stock," a leading fabricator comments. Adds another: "We're trying to liquidate our inventory of structurals as fast as we can. The stuff just isn't moving. The mills are promising us prompt delivery of wide flange beams, and four to five week service on high strength, low alloy material. There's no need for

Steel Shipments by Markets—March, 1960

(All grades; net tons)

Markets	March 1960	March 1959	First Three Months 1960	First Three Months 1959
Converting, processing	396,331	334,279	1,136,739	847,119
Forgings (except auto)	106,080	102,731	330,513	271,180
Fasteners	139,696	137,505	419,736	347,049
Warehouses	1,409,858	1,510,930	4,401,371	3,741,165
Construction	953,439	978,574	2,837,691	2,492,161
Contractors' products	402,061	411,893	1,194,102	1,084,082
Automotive	1,695,318	1,761,521	5,310,785	4,714,570
Railroad	326,270	328,156	984,183	745,997
Shipbuilding	60,067	75,272	198,586	226,428
Aircraft	8,064	7,171	25,569	16,977
Oil & gas drilling	45,864	57,692	169,694	159,149
Mining, quarrying, etc.	30,040	27,316	91,566	65,605
Agricultural	118,850	152,370	383,775	399,417
Machinery, etc.	490,518	492,217	1,440,586	1,282,488
Elec. machinery, etc.	225,858	250,394	692,121	636,007
Appliances, etc.	233,075	218,529	643,371	584,089
Other domestic equipment	209,533	209,586	593,068	577,338
Containers	705,892	776,534	1,979,795	1,890,128
Ordnance, military	10,752	13,066	36,190	39,301
Nonclassified	198,379	87,741	595,392	227,188
Total domestic shipments	7,765,945	7,933,477	23,464,833	20,347,438
Exports	199,936	184,211	502,134	488,464
Total shipments	7,965,881	8,117,688	23,966,967	20,835,902

Data from American Iron & Steel Institute.

us to carry more than a 30 day supply."

More I-beam steel bridges are being estimated in New England, with alternates asked on prestressed concrete—lump sum quotations are being specified in many cases. Plate girder tonnage inquiry is light. Fabricators are not anticipating plain material requirements but ask for prompt shipments of wide flange beams once they book new orders. In most cases, delivery on structural steel can be had within a month. On wide flange beam bridges in place, contractors quote an average of 12.00 cents a pound.

About 1200 tons of structurals were placed with fabricating plants in the Pacific Northwest last week. Additional tonnages are pending, including steel for the Bonneville Power Administration.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2100 tons, building No. 5, state university campus, Albany, N. Y., through Depot Construction Co., New York, to Bethlehem Steel Co., Bethlehem, Pa.

705 tons, three composite wide flange beam bridges, contract No. 3, Waterbury-Bolton, Vt.; Landers & Griffins Inc., Portsmouth, N. H., and Morrison-Knudsen Co. Inc., New York, low joint bidders, general contract; also, 205 tons of concrete reinforcing bars.

450 tons, deep sea oil terminal, Niskiski, Cook Inlet, Alaska, to Pacific Car & Foundry Co., Seattle; J. H. Pomeroy Co. and Ben C. Gerwick, San Francisco, joint contractors.

427 tons, steel sheet piling, Navy Purchasing Office, Brooklyn, N. Y., to Bethlehem Steel Export Co., New York.

400 tons, science building, Oregon University, Portland, Oreg., reported going to Stevens Equipment & Machinery Co., Salem, Oreg.; Vik Construction Co., Portland, general contractor.

110 tons, including reinforcing bars, state highway bridge, Union, Maine; Ross Construction Co., Augusta, Maine, general contractor.

STRUCTURAL STEEL PENDING

3767 tons (government furnished) tower steel, leg extensions, Rocky Reach-Paple Valley transmission line; bids to Bonneville Power Administration, Portland, Oreg., postponed from May 27 to June 10.

3278 tons, state highway bridges, including three deck plate girder structures, Reading, Pa.; bids in; also, 906 tons of concrete reinforcing bars, 445 tons steel piles, and 350 tons of mat reinforcing (mesh).

2017 tons (government furnished) tower steel, Schedule 3, Hood and Clackamas counties, Oregon, transmission line; bids to Bonneville Power Administration, Portland, Oreg., June 7.

1685 tons (government furnished) tower steel, Schedule 2, Hood and Clackamas counties, Oregon, transmission line; bids to Bonneville Power Administration, Portland, Oreg., June 23.

1000 tons, addition to Buick-Oldsmobile-Pontiac plant, Wilmington, Del., bids being received through Argonaut Realty Div., General Motors Corp., Detroit.

510 tons, state bridgework, Bergen County, New Jersey, bids June 9; also required, 800 tons of reinforcing bars and 617 tons of sheet steel piling.

500 tons, addition to Rayonier plant, Hoquiam, Wash.; bids in.

325 tons, Bangor, Ohio, area joint high school; bids asked.

320 tons, Shorewood School, Seattle; bids in.

285 tons, 3 span steel stringer bridge, Route 295, Portland, Maine; bids June 8 to Augusta, Maine.

250 tons, one, 2 span and two, 3 span wide flange beam bridges, Bridgewater, Vt.; Caledonia Sand & Gravel Co., Windsor, Vt., low on the general contract; also, 125 tons, concrete reinforcing bars.

200 tons, municipal bridge, Ithaca, N. Y.; bids June 6.

110 tons, redecking four state bridges, New Jersey; bids June 1, Trenton, N. J.; also 15,435 sq ft of steel grid flooring, and 1845 sq ft of formed bridge flooring.

110 tons, 3 span composite wide flange beam bridge, Lyndon, Vt.; bids in; also, 70 tons of concrete reinforcing bars.

REINFORCING BARS . . .

REINFORCING BARS PLACED

263 tons, Anchorage, Alaska, mental hospital, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Lease Co. Inc., Seattle, general contractor.

207 tons, Puyallup River Bridge, Pierce County, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; Puget Construction Co., Seattle, general contractor.

190 tons, deep water oil terminal, Niskiski, Alaska, to Pacific Coast Div., Bethlehem Steel Co., Seattle.

REINFORCING BARS PENDING

435 tons, Idaho state underpass and bridge, Minidoka County; bids to Boise, Idaho, June 14; also 40 tons wire fence, Idaho County.

140 tons, girder bridge, Olympic National Forest, Washington State; bids to the Bureau of Public Roads, Portland, Oreg., June 9.

PLATES . . .

PLATES PLACED

100 tons or more, fuel transporting units, 6000 gallon capacity each (16), U. S. Ordnance District, St. Louis, to Butler Mfg. Co., Kansas City, Mo., at $1,070,080.

PLATES PENDING

3700 tons, medium tensile, Naval shipyard, Philadelphia; bids May 31, supply officer.

3000 tons, 9½ miles, 40 in. water supply line, Bellingham, Wash.; C. V. Wilder Co., Bellingham, low bidder at $1,066,700 for concrete cylinder, and $1,129,200 for welded steel.

1400 tons, Schedule No. 6, Seattle's Toit River supply line project, 33 in. and 54 in.; also alternatives for concrete cylinder; bids June 1.

730 tons, high tensile, pickled and painted, Navy Purchasing Office, Washington; bids May 23.

310 tons, hull plates, carbon, grade M, Navy, General Stores Supply Office, Philadelphia; bids May 31.

200 tons, high tensile, Naval shipyard, Philadelphia; bids June 1 to the supply officer; also 460 tons of bars and shapes, June 2.

100 tons, replacement gasoline storage tank, Aberdeen Proving Ground, Maryland; bids June 1, Aberdeen.

PIPE . . .

CAST IRON PIPE PLACED

239 tons, 13th Navy District project, 6 and 8 in., to U. S. Pipe & Foundry Co., Seattle.

100 tons, 6 and 8 in., Yakima and Ellensburg, Wash., to U. S. Pipe & Foundry Co., Seattle.

100 tons, including 57 tons of 6 and 14 in. for Auburn, Wash., to Pacific States Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

150 tons, 8 and 10 in.; bids to Bothell, Wash., June 2.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Union Pacific, thirty 2000-hp road switchers, to Electro-Motive Div., General Motors Corp., La Grange, Ill.

RAILROAD CARS PLACED

Union Tank Car Co., 55 tankcars to its own shops at Whiting, Ind.

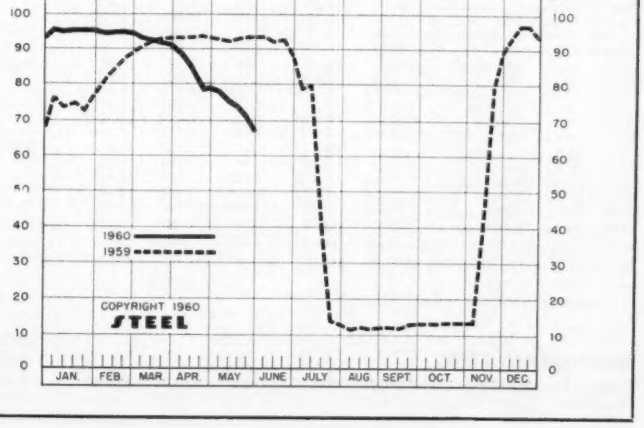
DISTRICT INGOT RATES

(Percentage of capacity utilized)

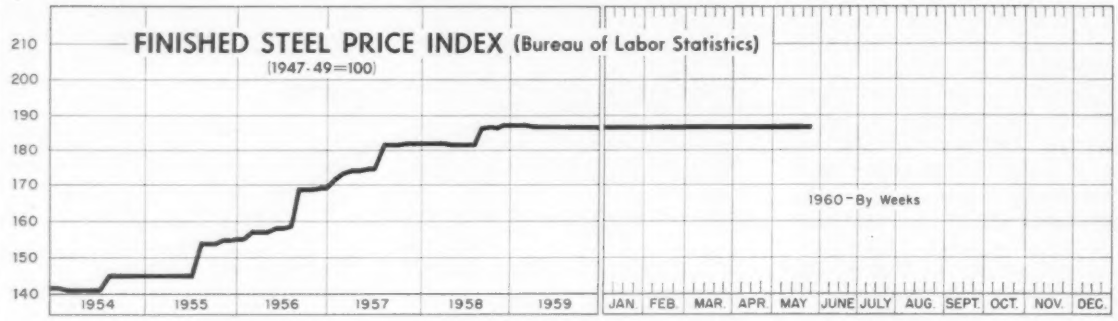
	Week Ended May 29	Week Ago	Month Ago	Year Ago
Northeastern	71	76	81	94
Buffalo	76	74	80	100
Pittsburgh	69	72	78	95
Youngstown	41	46	56	88
Cleveland	76	75	73	92
Detroit	81	93	100	95
Chicago	70	73	83	92
Cincinnati	54	82	82	86
St. Louis	79	83	85	108
Southern	67	72	79	93
Western	69	73	72	96
Total Industry	66.9	71.3	77.6	93.6
Index (1947-49=100)	118.7	126.4	137.6	165.0
Net Tons (In thousands)	1,906	2,031	2,210	2,650

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



May 24, 1960	Week Ago	Month Ago	Apr. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 24

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.625
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.765
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.585
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.825
Wire, Barbed (80-rod spool)	8.766
Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	May 25 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.45
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	33.33	33.33	33.67	34.00	34.67

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	May 25 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton	May 25 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$33.50	$33.50	$34.50	$34.50	$34.50
No. 1 Heavy Melt, E. Pa.	35.00	35.00	35.00	33.50	35.50
No. 1 Heavy Melt, Chicago	31.50	31.50	31.50	34.00	34.00
No. 1 Heavy Melt, Valley	32.50	34.50	36.50	37.50	34.50
No. 1 Heavy Melt, Cleve.	31.50	31.50	33.50	35.50	31.50
No. 1 Heavy Melt, Buffalo	30.50	30.50	30.50	31.50	29.50
Rails, Rerolling, Chicago	52.50	52.50	53.50	57.50	51.50
No. 1 Cast, Chicago	42.50	42.50	45.50	49.50	40.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25

Steel Prices

Mill prices as reported to STEEL, May 25, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 114, footnotes, page 119.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 ....$76.00

INGOTS, Alloy (NT)
Detroit S41 ....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 ....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
Sharon,Pa. S3 ....82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 ....80.00
Buffalo R2 ....80.00
Clairton,Pa. U5 ....80.00
Ensley,Ala. T2 ....80.00
Fairfield,Ala. T2 ....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 ....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 ....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 ....80.00
Youngstown R2 ....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 ....99.50
Canton,O. R2 ....102.00
Clairton,Pa. U5 ....99.50
Conshohocken,Pa. A3 ..104.50
Ensley,Ala. T2 ....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 ....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 ....99.50
Geneva,Utah C11 ....99.50
Houston S5 ....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 ....109.00
Midland,Pa. C18 ....99.50
Munhall,Pa. U5 ....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 ....109.00
Sharon,Pa. S3 ....99.50
S.Chicago R2, U5, W14 ..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 ....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32 ..119.00
Buffalo R2 ....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 ..126.00
Detroit S41 ....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 ....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 ....119.00
Houston S5 ....124.00
Ind.Harbor,Ind. Y1 ....119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 ....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 ....119.00
Midland,Pa. C18 ....119.00
Munhall,Pa. U5 ....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 ....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 ....119.00
Warren,O. C17 ....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 ....$122.50
Canton,O. R2 ....125.00
Cleveland R2 ....122.50
Gary,Ind. U5 ....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 ....122.50

SKELP
Aliquippa,Pa. J5 ....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 ....5.05
Pittsburgh J5 ....5.05
Warren,O. R2 ....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 ....6.40
Alton,Ill. L1 ....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 ....6.40
Cleveland A7 ....6.40
Donora,Pa. A7 ....6.40
Fairfield,Ala. T2 ....6.40
Houston S5 ....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 ....6.40
Joliet,Ill. A7 ....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 ....6.50
LosAngeles B3 ....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 ....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 ....6.50
Struthers,O. Y1 ....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 ....5.50
Atlanta A11 ....5.70
Bessemer,Ala. T2 ....5.50
Bethlehem,Pa. B2 ....5.55
Birmingham C15 ....5.50
Clairton,Pa. U5 ....5.50
Fairfield,Ala. T2 ....5.50
Fontana,Calif. K1 ....6.30
Gary,Ind. U5 ....5.50
Geneva,Utah C11 ....5.50
Houston S5 ....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 ....5.55
Joliet,Ill. P22 ....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 ....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 ....5.50
Niles,Calif. P1 ....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 ....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 ....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 ....5.55
Clairton,Pa. U5 ....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 ....5.50
Sterling,Ill. N15 ....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....6.90
Munhall,Pa. U5 ....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 ....8.05
Bessemer,Ala. T2 ....8.05
Bethlehem,Pa. B2 ....8.10
Clairton,Pa. U5 ....8.05
Fairfield,Ala. T2 ....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 ....8.05
Geneva,Utah C11 ....8.05
Houston S5 ....8.15
Ind.Harbor,Ind. I-2, Y1 8.05
Johnstown,Pa. B2 ....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 ....8.75
Munhall,Pa. U5 ....8.05
Seattle B3 ....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 ....7.75
Struthers,O. Y1 ....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 ....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 ....8.05
S.Chicago,Ill. U5 ....8.05
Sterling,Ill. N15 ....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 ....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 ....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 ....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 ....5.50
Bessemer,Ala. T2 ....5.30
Clairton,Pa. U5 ....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 ....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 ....5.30
Fairfield,Ala. T2 ....5.30
Farrell,Pa. S3 ....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 ....5.30
Geneva,Utah C11 ....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 ....5.30
Houston S5 ....5.40
Ind.Harbor,Ind. I-2, Y1..5.30
Johnstown,Pa. B2 ....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 ....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 ....5.30
Newport,Ky. A2 ....5.30
Pittsburgh J5 ....5.30
Riverdale,Ill. A1 ....5.30
Seattle B3 ....6.20
Sharon,Pa. S3 ....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2..5.30
Sterling,Ill. N15 ....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 ....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 ....7.85
Geneva,Utah C11 ....7.05
Houston S5 ....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 ....7.95
Ashland,Ky. A10 ....7.95
Bessemer,Ala. T2 ....7.95
Clairton,Pa. U5 ....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 ....7.95
Coatesville,Pa. L7 ....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 ....7.95
Ecorse,Mich. G5 ....7.95
Fairfield,Ala. T2 ....7.95
Farrell,Pa. S3 ....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 ....7.95
Geneva,Utah C11 ....7.95
Houston S5 ....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 ....7.95
Munhall,Pa. U5 ....7.95
Pittsburgh J5 ....7.95
Seattle B3 ....8.85
Sharon,Pa. S3 ....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2..7.95
Warren,O. R2 ....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 ....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 ....7.50
Economy,Pa. B14 ....7.50
Farrell,Pa. S3 ....7.50
Fontana,Calif. K1 ....8.30
Gary,Ind. U5 ....7.50
Houston S5 ....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 ....7.50
Lowellville,O. S3 ....7.50
Munhall,Pa. U5 ....7.50
Newport,Ky. A2 ....7.50
Pittsburgh J5 ....7.50
Seattle B3 ....8.40
Sharon,Pa. S3 ....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 ....7.50

FLOOR PLATES
Cleveland J5 ....6.375
Conshohocken,Pa. A3...6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall,Pa. U5 ....6.375
Pittsburgh J5 ....6.375
S.Chicago,Ill. U5 ....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 ....6.05
Warren,O. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 ....5.875
Atlanta(9) A11 ....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 ....5.675
Canton,O.(23) R2 ....6.15
Clairton,Pa.(9) U5 ...5.675
Cleveland(9) R2 ....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ...5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 ....5.675
Houston(9) S5 ....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2..5.675
Joliet,Ill. P2 ....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 ....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 ....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 ....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'e'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 ..6.375
Warren,O. C17 ....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 ....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 ....6.725
Detroit S41 ....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 ....6.725
Fairless,Pa. U5 ....6.875
Farrell,Pa. S3 ....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 ....6.725
Houston S5 ....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 ....7.775
Lowellville,O. S3 ....6.725
Massillon,O. R2 ....6.725
Midland,Pa. C18 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburg J5 ....6.725
Sharon,Pa. S3 ....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 ....6.725
Warren,O. C17 ....6.725
Youngstown U5 ....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 ....8.30
Bessemer,Ala. T2 ....8.30
Bethlehem,Pa. B2 ....8.30
Clairton,Pa. U5 ....8.30
Cleveland R2 ....8.30
Ecorse,Mich. G5 ....8.30
Fairfield,Ala. T2 ....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 ....8.30
Houston S5 ....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 ....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 ....9.00
Pittsburgh J5 ....8.30
Seattle B3 ....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 ....8.30
Youngstown U5 ....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 ....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 ....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ....5.675
Atlanta A11 ....5.875
Joliet,Ill. P22 ....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 ....6.375
Pittsburgh J5 ....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 ....6.52
Seattle B3 ....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.80
Clairton,Pa. U5 ....6.80
Gary,Ind. U5 ....6.80
Houston S5 ....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 ....6.80
Youngstown U5 ....6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 ....10.175
Elyria,O. W8 ....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 ....8.25
Buffalo B5 ....7.70
Camden,N.J. P13 ....8.10
Carnegie,Pa. C12 ....7.65
Chicago W18 ....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 ....7.85
Detroit S41 ....7.65
Donora,Pa. A7 ....7.65
Elyria,O. W8 ....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 ....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 ....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 ....7.65
Monaca,Pa. S17 ....7.65
Newark,N.J. W18 ....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 ....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 ....7.65
Warren,O. C17 ....7.65
Waukegan,Ill. A7 ....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 ....9.025
Camden,N.J. P13 ....9.20
Canton,O. T7 ....9.025
Carnegie,Pa. C12 ....9.025
Chicago W18 ....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 ....9.225
Detroit S41 ....9.025
Donora,Pa. A7 ....9.025
Elyria,O. W8 ....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 ....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 ....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 ....9.025
Monaca,Pa. S17 ....9.025
Newark,N.J. W18 ....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 ....9.025
Warren,O. C17 ....9.025

Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ....9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft.Worth,Tex.(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2...5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ...5.925
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ....5.675
Sterling,Ill. N15 .....5.775
Struthers O, Y1 .....5.675
Tonawanda,N. Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ...5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N. Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.35
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 .19.80
McK.Rks.(S.R.) L5 ....14.50
McK.Rks.(D.R.) L5 ....19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 .....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ...5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 .5.10
SparrowsPoint,Md. B2 .5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 ....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 .....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 .....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapmann&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackawanna,N.Y.(26) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 .8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ..7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 .7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15..7.875
NewCastle,Pa. B4 .....7.425
NewCastle,Pa. M22 ....7.525
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M22	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.56
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	0.80C	1.05C	1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.86	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M22 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1..7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.60
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irwin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O R2 (20-27 Ga.)	7.90	8.10	8.30

TIN PLATE,Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Ind.Harb. Y1	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.30
Fairless,Pa. U5	8.30
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)	
Aliquippa,Pa. J5	7.85
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. Y1	7.85
Irvin,Pa. U5	7.85
Yorkville,O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)	
Gary,Ind. U5	$10.05
Irvin,Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed 1½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	....	12.40	13.56	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.56	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vantergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed 1½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	..	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed, †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O. (24) S1 ....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ....8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 ....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 .8.10
Sterling,Ill. (1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ....12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ....12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ..13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.05
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville, Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 ....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 ....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 ....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

WIRE, Tire Bead

Bartonville,Ill. K4 ....17.15
Monessen,Pa. P16 ....17.15
Roebling,N.J. R5 .....17.65

ROPE WIRE	(A)
Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S1	13.45
KansasCity,Mo. U3	13.70
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

Face up to the true cost of inventories

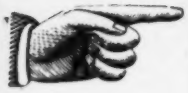
$253.50 *in interest alone.* That's what it would have cost our customer to stock the steel for his order of these 5-16″ gage tube sheets—had he decided to blank and punch these shapes in his own plant. His plate stock cost would have been $25,350. The interest cost of carrying this for 90 days at—say 4%—is $253.50.

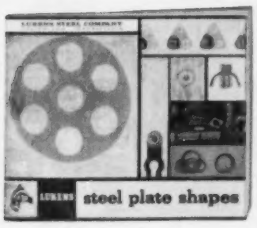
Fortunately, the customer took advantage of Lukens Steel Plate Shapes Service and avoided tying up his capital in plate inventory. *Plus:* he paid no freight charge on the 50% scrap involved . . . instead he was given an allowance for the scrap at high steel mill prices. He avoided the expense of scrap handling. He eliminated shop spoilage.

Moral: Don't tie up capital in steel plate inventories. Contact Lukens for Steel Plate Shapes Service . . . flame cutting, shearing, blanking, pressing, bending, welding—of carbon and alloy plate produced on our own rolling mills. Call or write Fabrication Building, Lukens Steel Company, Coatesville, Pennsylvania. Address Dept. B 501.

LUKENS ®

STEEL PLATE USERS:





This informative free booklet tells you how to take advantage of Lukens Steel Plate Shapes Service to cut your costs. Send in the reply card for your copy today.

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BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 62, SEC. 34.9 P. L. & R. COATESVILLE, PA.

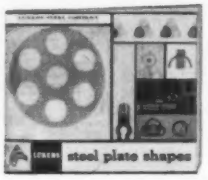
LUKENS STEEL COMPANY

384B Fabrication Building

Coatesville, Pennsylvania

STEEL PLATE USERS! YOU CAN..

☞ Save on inventory costs! ☞ Save on scrap handling! ☞ Save on freight! ☞ Save on equipment and manpower! ☞ Send for this informative free booklet, "Lukens Steel Plate Shapes," and find out how and why.



☐ Please send me your free booklet, Lukens Steel Plate Shapes.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.)(per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88

Sterling,Ill.(37) N15 ... 8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	217
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa. 9-11½ga. J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Galv. Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

Wire, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City,Ala. R2	.9.00	9.55**
Aliquippa J5	.8.65	9.325§
Atlanta(48) A11	.9.10	9.775§
Bartonville(48) K4	9.85	19.90
Buffalo W12	.9.00	9.55†
Cleveland A7	.9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	.9.00	9.55†
Duluth A7	.9.00	9.55†
Fairfield T2	.9.00	9.55†
Houston(48) S5	.9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80†‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	.9.00	9.55†
KansasCity(48) S5	9.25	9.80**
Kokomo(48) S16	.9.10	9.65†
LosAngeles B3	.9.95	10.625§
Minnequa C10	.9.25	9.80**
Monessen(48) P7	.8.65	9.35§
Palmer,Mass. W12	.9.30	9.85†
Pitts.,Calif. C11	.9.95	10.50†
Rankin,Pa. A7	.9.00	9.55†
S.Chicago R2	.9.00	9.55**
S.SanFran. C10	.9.95	10.50**
Spar'wsPt.(48) B2	9.10	9.775§
St'ling(37)(48) N15	.9.10	9.80
Struthers,O. Y1	.9.00	9.65‡
Worcester,Mass. A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. ‡10c. ‡‡Less than 10c. ††10.50c. ‡‡‡1.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS, Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 7/8 in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) 3/8" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over 5/8 in.; 7.375c, for widths 5/8 in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling—Ingot	Rerolling—Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—5% Carbon Base	Plates—10% Carbon Base	Plates—15% Carbon Base	Plates—20%	Sheets—20% Carbon Base
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base—Cold Rolled—10%	Strip, Carbon Base—Cold Rolled—Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.53	8.66	10.06	....	10.94	9.33	11.30	16.38	9.92	9.15	10.50
Birmingham	9.43	10.20	10.46	....	10.41	9.09	13.14	16.76	9.00	9.29	10.90
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.74	10.20	10.95	53.00	10.40	8.84	10.65	15.95	9.33	8.67	10.46
Cincinnati	8.91	10.26	11.00	53.43	10.72	9.16	11.53	16.27	9.89	9.05	10.79
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	9.62	10.43	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.02
Detroit	9.00	10.46	11.30	56.50	10.77	9.15	11.01	16.23	9.89	9.04	10.72
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	10.03	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.62
Indianapolis	9.18	10.64	11.39	....	10.84	9.28	11.09	16.39	9.77	9.11	10.90
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.59	11.29	12.20	57.60	11.29	9.67	14.20	17.35	10.54	9.82	11.79
Milwaukee	8.88	10.34	11.09	....	10.54	8.98	10.89	16.09	9.55	8.81	10.60
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	9.10	10.00	10.89	52.17	11.10	9.50	11.95	16.38	9.85	9.55	10.55
Pittsburgh	8.73	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
St. Louis	8.84	10.58	11.33	....	10.50	8.95	11.28	16.33	9.45	8.78	10.57
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.49
San Francisco	10.17	11.69	11.45	55.10	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.07	11.44	12.05	56.52	11.84	9.96	16.20	17.80	10.59	10.17	12.46
Spokane, Wash.	9.97	11.34	11.95	57.38	11.74	9.86	16.20	17.80	10.49	10.07	12.36

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ¾ in.—2⅛ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$32, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, Concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Canadian Steel

(Cents per pound, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon, Forging Quality (net ton)	$97.00
Alloy (net ton)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant anneal	8.40
L. C. Industrial	7.20
Upholstery Spring	8.55
M. B. Spring	8.85
Bars & Small Shapes	
Carbon, merchant quality	5.40
Carbon, special quality	5.85
Alloy	6.40
Bar Mill Bands:	
Carbon	5.40
Alloy	8.05
Structural Size Angles & Zees	5.40
Plates:	
Carbon	5.45
Sheets & Coils, Hot Rolled:	
Carbon Sheets	4.95
Carbon Strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon Sheets	6.35
Carbon Strip (0.080 and lighter)	6.35
Carbon Strip (0.081 and heavier)	6.65
Sheets & Coils, Galvanized:	
Standard Quality	6.70
Culvert Quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field Grade	9.00
Armature Grade	9.50
Electrical Grade	10.15
Tin Mill Products (Per Base Box; 100 lb base wt)	
Coke Tin Plate (1.25 lb pot yield)	$10.60
Electrolytic Tin Plate (0.25 lb coating)	9.10
Black Plate	8.30
Nails, c.l. lots, wholesale	Col. 110

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ½ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe.	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade,	88.00-700.00 in standard 200-lb containers; all minus 200 mesh.
Aluminum:	
Atomized, 500-lb drum freight allowed, c.l.	39.80; ton lots 41.80
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-50.10†
Bronze, 5000-lb lots	53.10-56.70†
Copper, electrolytic	15.00*
Copper, reduced	15.00*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr, min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens: New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens.	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.75	$5.65	$5.65	$5.50	$5.85
Bar Size Angles	5.85	5.75	5.75	5.60	5.95
Structural Angles	5.65	5.55	5.55	5.40	5.75
I-Beams	5.60	5.50	5.50	5.35	5.70
Channels	5.60	5.50	5.50	5.35	5.70
Plates (basic bessemer)	6.00	5.90	5.90	5.75	6.10
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.60	9.65	9.50	9.40	9.75
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.25	6.15	6.15	6.00	6.35
Merchant Bars	5.85	5.75	5.75	5.60	5.95
Hot-Rolled Bands	6.20	6.10	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	6.40	6.40	6.30	6.25	6.60
Wire Rods, O. H., No. 5	6.75	6.75	6.65	6.60	6.95
Bright Common Wire Nails (‡)	8.50	7.40	7.40	7.25	7.65

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42.45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ¼" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

Scrap Holds Despite Light Buying

STEEL's composite on No. 1 heavy melting steel remains at $33.33 for the fourth straight week. Exports provide some market support in face of sagging steel operations

Scrap Prices, Page 126

• **Pittsburgh** — Brokers' bids on Pennsylvania Railroad scrap were from $1 to $3 a ton less than last month's. Offered $38.25 for its No. 1 heavy melting, $3 less than the last time, the Pennsylvania refused to sell. In another indication of market weakness, GM's Fisher Body Div. sold some surplus No. 1 factory bundles at $35, f.o.b. plant, $2 less than brokers bid on the previous list. A major consumer has been asking its scrap suppliers to hold back shipments. There's speculation in the trade that the next sale of No. 1 heavy melting scrap will be at $32 or less.

• **Chicago**—With steelmaking operations continuing downward and little activity in area foundries, the scrap here is at a standstill. There is little buying of the dealer grades, and only a little trading is noted in industrial material. The few sales reported involve small tonnages. Several grades have been traded at $1 a ton less than previously quoted. A malleable foundry purchased angles and splice bars at $42 a ton, off $2.

• **Cleveland** — Prices are easier, but they are nominal in the absence of a representative buying test. No. 1 heavy melting continues at $31-$32 in this area and quoted $33-$34 in the Valley. Closing of bids on automotive lists at monthend will point the price trend for June. Depressed steelmaking operations in the Valley are contributing to the pessimism generally prevailing among scrapmen.

• **Philadelphia**—No. 2 bundles are off $1 a ton to $21, delivered, based on light domestic sales. Other steel grades are unchanged, with little business being done to afford a market test. Good export volume in the open hearth grades is providing market support. The cast grades are quiet, with malleable off nominally to $53-$54, delivered.

• **New York** — Trading continues slow in the domestic market, but foreign demand is providing some activity. With one exception, brokers' buying prices are unchanged. The exception: A decline of $1 a ton on heavy breakable cast, now quoted at $33-$34.

• **Buffalo**—The tense international situation has not had any noticeable effect on the scrap market. Prices are unchanged, and show no tendency to advance. Dealers say it will take improved steel production to put new life into the market. No new mill orders are anticipated until early next month. Present indications are business will be placed then at about today's price levels. Cast iron scrap is steady, though Canadian buyers reportedly have temporarily withdrawn from the market.

• **Cincinnati**—Prices on the key steelmaking grades slipped $1 a ton in dealer quotations last week. No. 1 heavy melting is quoted $28.50-$29.50. The market undertone is weak, and a further price decline is predicted. Limited buying is expected next month.

• **St. Louis**—Prices are nominal because there is virtually no business to provide a test. Only a few brokers are booking orders, and the prices prevailing on these transactions are not considered representative for the over-all market.

• **Birmingham** — Further cuts in prices have failed to spur buying in this area. A limited movement of the foundry grades is reported—but at prices named by the buyers. Most dealers accept proffered tonnages without quibbling over the price named. Open hearth and electric furnace scrap is inactive, with buyers staying out of the market.

• **Houston**—The market is on dead center. Prices are too low to generate a normal flow to the yards, and demand is not strong enough to push prices higher. The result: Dwindling over-the-scale traffic and slow movement to consumers.

Local brokers are still working on April mill commitments. Export buying is slow. New Orleans continues to be the most active port in the Western Gulf area; shippers

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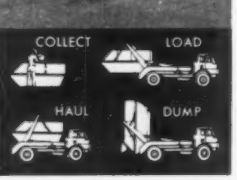

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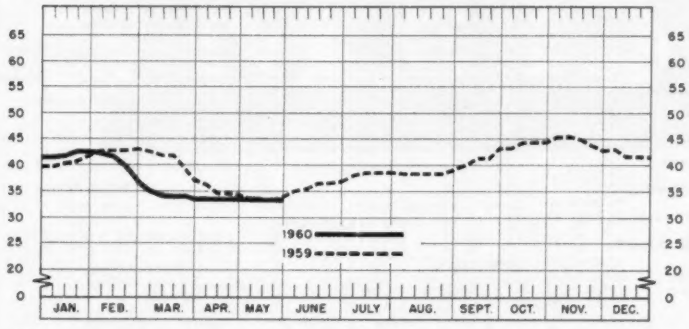
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



May 25 1960	Week Ago	Month Ago	Year Ago	Apr. Avg.
$33.33	$33.33	$33.67	$34.00	$33.67

are offered $35 for No. 1 and $32 for No. 2 heavy melting steel, delivered dock.

• **Detroit**—The market is soft with the monthend auto lists closing. Absence of mill buying has weakened the price outlook. Brokers and dealers figure prices will be off $1 or $2 a ton on the lists.

Reported plans of a large scrap interest to build a big yard close to the Steel Co. of Canada's plant in Hamilton, Ont., is disturbing the local market. Local dealers think such a move will compel them to ship more of their material to the Valley mills and would serve to further depress prices.

• **Seattle** — Dealers and exporters have different ideas about going prices. The main buyer in this area, currently out of the market, is reported to have paid $33 for unprepared No. 1 on its last purchase. Exporters say: On that basis, prepared scrap should be quoted $38 or $39 a ton, allowing $6 for preparing.

• **San Francisco**—Despite slow buying by the mills, scrap is not piling up rapidly in dealers' yards. Heavy commitments for export are keeping the supplies moving steadily at firm prices.

• **Los Angeles**—While the movement of scrap to district mills has been limited the last 60 days or more, the market is being supported by export shipments. Prices are unchanged, but they are weak.

Blast Furnace Production Declines in April

Blast furnace production (pig iron and ferroalloys) in April totaled 6,830,093 net tons, reports the American Iron & Steel Institute. That compares with output of 7,793,411 tons in March.

Production in the first four months this year amounted to 29,870,325 net tons compared with 27,355,724 in the like 1959 period.

Furnace operations averaged 86.1 per cent in April and 93.4 per cent in the first four months. In April, 1959, operations averaged 95 per cent, and the first four months 87.9 per cent.

The breakdown of production by states for April and the first four months:

Blast Furnace Production—April, 1960

(Net tons)

STATES:	April 1960	First Four Months 1960	1959
Massachusetts, New York	493,554	2,015,360	1,699,042
Pennsylvania	1,762,474	8,052,269	7,126,881
Maryland, Virginia, W. Virginia	629,124	2,627,167	2,365,612
Kentucky, Tennessee, Texas	184,362	684,245	614,013
Alabama	330,045	1,505,366	1,534,642
Ohio	1,276,534	5,678,044	5,182,406
Indiana	860,895	3,391,765	3,259,350
Illinois	547,548	2,591,613	2,317,613
Michigan, Minnesota	417,543	1,870,376	1,768,447
Colorado, Utah, California	328,014	1,454,120	1,487,718
Totals	6,830,093†	29,870,325*	27,355,724‡

†Includes 69,864 tons of ferromanganese and spiegeleisen.
*Includes 297,456 tons of ferromanganese and spiegeleisen.
‡Includes 196,371 tons of ferromanganese and spiegeleisen.
Data from American Iron & Steel Institute.

African Manganese Mining Operation to Start Soon

Initial operations in an $89 million development program to tap rich deposits of manganese ore in the heart of Africa will begin this year. They'll start with the delivery of diesel-electric locomotives ordered from General Electric Co. by Compagnie Miniere de l'Ogooue (COMILOG), a French mining concern.

The manganese ore is in four plateaus near Franceville, Gabon, Africa. To extract the mineral, the company will construct a 60 mile cableway to stretch from the mining area to M'Binda, Republic of Congo. Its capacity: 850,000 tons a year. From that point, an 180 mile railroad (42 in. gage) will be built to a siding of the Congo-Ocean railroad near Dolisie.

Pig Iron . . .

Pig Iron Prices, Page 121

Merchant foundry iron is moving steadily although at a restricted level. Most sellers believe the pres-

(*Please turn to Page* 131)

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(chilled iron)
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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, May 25, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 25	$33.33
May 18	33.33
Apr. Avg.	33.67
May 1959	33.58
May 1955	34.87

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	34.00-35.00
No. 2 bundles	25.00-26.00
No. 1 busheling	33.00-34.00
No. 1 factory bundles	*37.00-38.00*
Machine shop turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Short turnings	*21.00-22.00*
Cast iron borings	*21.00-22.00*
Cut structurals:	
2 ft and under	*39.00-40.00*
3 ft and under	*38.00-39.00*
Heavy turnings	30.00-31.00
Punchings & plate scrap	*42.00-43.00*
Electric furnace bundles	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	*42.00-43.00*
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	*50.00-51.00*

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 2 ft and under	*56.00-57.00*
Rails, 18 in. and under	*57.00-58.00*
Random rails	*50.00-51.00*
Angles, splice bars	45.00-46.00
Railroad specialties	47.00-48.00
Rails, rerolling	56.00-57.00

Stainless Steel Scrap

18-8 bundles & solids	200.00-205.00†
18-8 turnings	100.00-105.00†
430 bundles & solids	100.00-105.00†
430 turnings	50.00-55.00†

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	27.00-28.00
No. 1 factory bundles	*35.00-36.00*
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	*19.00-20.00*
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*36.00-37.00*
Punchings & plate scrap	*37.00-38.00*

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	37.00-38.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	49.00-50.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
R.R. malleable	48.00-49.00
Rails, 2 ft and under	*49.00-50.00*
Rails, 18 in. and under	*50.00-51.00*
Angles, splice bars	*41.00-42.00*
Axles	51.00-52.00
Rails, rerolling	52.00-53.00

Stainless Steel Scrap

18-8 bundles, solids	195.00-200.00
18-8 turnings	*100.00-105.00*
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*25.00-26.00*
No. 2 heavy melting	*14.00-15.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*12.50-13.50*
No. 1 busheling	*25.00-26.00*
Machine shop turnings	*10.00-11.00*
Mixed borings, turnings	*9.00-10.00*
Shovel turnings	*8.00-9.00*

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Stove plate	*30.00-31.00*
Heavy breakable	*30.00-31.00*
Unstripped motor blocks	*22.00-23.00*
Charging box cast	*30.00-31.00*
Clean auto cast	*43.00-44.00*

CLEVELAND

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	23.00-24.00
No. 1 factory bundles	*34.00-35.00*
No. 1 bundles	31.00-32.00
No. 2 bundles	19.00-20.00
No. 1 busheling	*31.00-32.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	*32.00-33.00*
Cut structurals, plate 2 ft and under	*39.00-40.00*
Low phos. punchings & plate	*31.00-32.00*
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	33.00-34.00

Cast Iron Grades

No. 1 cupola	*44.00-45.00*
Charging box cast	33.00-34.00
Heavy breakable cast	*30.00-31.00*
Stove plate	*39.00-40.00*
Unstripped motor blocks	*32.00-33.00*
Brake shoes	35.00-36.00
Clean auto cast	*50.00-51.00*
Burnt cast	*40.00-41.00*
Drop broken machinery	*50.00-51.00*

Railroad Scrap

R.R. malleable	49.00-50.00
Rails, 2 ft and under	*54.00-55.00*
Rails, 18 in. and under	*55.00-56.00*
Rails, random lengths	*47.00-48.00*
Cast steel	*40.00-41.00*
No. 1 railroad cast	*50.00-51.00*
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	56.00-57.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	*185.00-190.00*
18-8 turnings	*85.00-90.00*
430 clips, bundles, solids	*90.00-95.00*
430 turnings	*20.00-30.00*

YOUNGSTOWN

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 busheling	*33.00-34.00*
No. 1 bundles	*33.00-34.00*
No. 2 bundles	22.00-23.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	*35.00-36.00*
Electric furnace bundles	*35.00-36.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*

BUFFALO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	30.00-31.00
No. 2 bundles	22.00-23.00
No. 1 busheling	30.00-31.00
Shovel turnings	19.00-20.00
Machine shop turnings	14.00-15.00
Cast iron borings	17.00-18.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00-43.00
No. 1 machinery	48.00-49.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*28.50-29.50*
No. 2 heavy melting	24.50-25.50
No. 1 bundles	*28.50-29.50*
No. 2 bundles	19.50-20.50
No. 1 busheling	*28.50-29.50*
Machine shop turnings	*11.00-12.00*
Mixed borings, turnings	*11.00-12.00*
Shovel turnings	*14.00-15.00*
Cast iron borings	*13.00-14.00*
Low phos. 18 in.	36.00-37.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Heavy breakable cast	35.00-36.00
Charging box cast	37.00-38.00
Drop broken machinery	*49.00-50.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*32.00-33.00*
Rails, 18 in. and under	*53.00-54.00*
Rails, random lengths	*46.00-47.00*

PHILADELPHIA

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	37.00
No. 2 bundles	*21.00*
No. 1 busheling	37.00
Electric furnace bundles	38.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00†
Machine shop turnings	17.00†
Heavy turnings	29.00‡
Structurals & plates	38.00-40.00
Couplers, springs, wheels	44.00
Rail crops, 2 ft & under	58.00-60.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	43.00
Drop broken machinery	51.00-52.00
Malleable	*53.00-54.00†*

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	*30.00-34.00*

Stainless Steel

18-8 sheets, clips, solids	180.00-185.00
18-8 borings, turnings	85.00-90.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*25.00-26.00*
No. 2 heavy melting	22.00-23.00
No. 1 bundles	*25.00-26.00*
No. 1 busheling	*25.00-26.00*
Machine shop turnings	6.00-7.00
Shovel turnings	*10.00-11.00*
No. 1 cast	39.00-40.00
Mixed cupola cast	*32.00-33.00*
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*18.00-19.00*
No. 1 busheling	*34.00-35.00*
Cast iron borings	*10.00-11.00*
Machine shop turnings	*18.00-19.00*
Shovel turnings	21.00-22.00
Bar crops and plate	*38.00-39.00*
Structurals & plate	*37.00-38.00*
Electric furnace bundles	*34.00-35.00*
Electric furnace:	
3 ft and under	33.00-34.00
2 ft and under	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Stove plate	*49.00-50.00*
Unstripped motor blocks	*38.00-39.00*
No. 1 wheels	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt.	*30.00-31.00*
Rails, 18 in. and under	*45.00-46.00*
Rails, random lengths	*40.00-41.00*
Angles, splice bars	*40.00-41.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	31.00†
No. 2 heavy melting	28.00†
No. 1 bundles	33.00†
No. 2 bundles	19.00†
No. 1 busheling	33.00†
Machine shop turnings	13.00†
Shovel turnings	15.00†

Cast Iron Grades

No. 1 cupola	45.00†
Charging box cast	37.00†
Heavy breakable cast	35.00†
Unstripped motor blocks	35.00†
Clean auto cast	47.00†
Stove plate	39.00†

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†
Rails, random lengths	40.00†
Rails, rerolling	50.00†
Rails, 18 in. and under	43.00†
Angles, splice bars	41.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	19.00
Machine shop turnings	13.00-13.50
Low phos. plate & structurals	38.00-39.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	27.00†
Foundry malleable	31.00†
Unstripped motor blocks	31.00-32.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†

LOS ANGELES

No. 1 heavy melting	*32.00*
No. 2 heavy melting	*29.00*
No. 1 bundles	*27.00*
No. 2 bundles	17.00
Machine shop turnings	*15.00*
Shovel turnings	*15.00*
Cast iron borings	16.00
Cut structurals and plate 1 ft and under	43.00

Cast Iron Grades

No. 1 cupola	40.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	35.00
No. 2 heavy melting	32.00
No. 2 bundles	*23.00*
Shovel turnings	16.00
Electric furnace bundles	*48.00*

Cast Iron Grades

No. 1 cupola	*35.00*
Heavy breakable	*31.00*
Unstripped motor blocks	*25.00*
Stove plate (f.o.b. plant)	*20.00*

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*32.00*
No. 2 bundles	*23.00*
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Electric furnace No. 1	*48.00*

Cast Iron Grades

No. 1 cupola	*35.00*
Heavy breakable cast	*31.00*
Unstripped motor blocks	*25.00*
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	*46.00*
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	20.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades‡

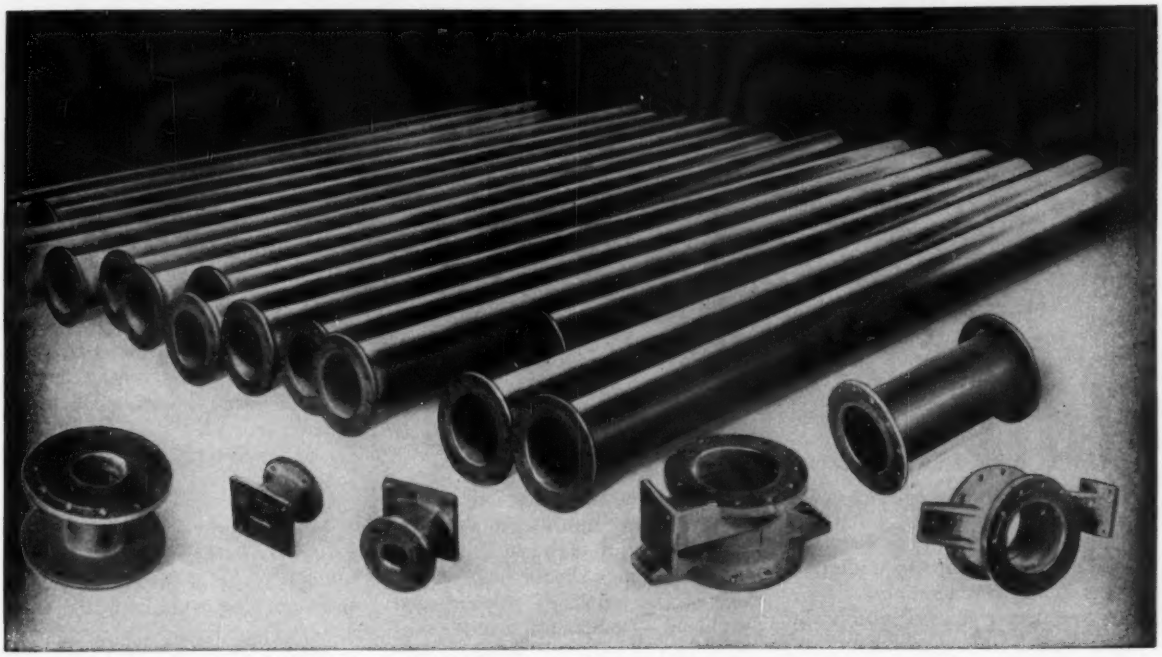
No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.

HERESITE

REG. U. S. PAT. OFFICE

COATED IRON PIPES AND FITTINGS PROTECT YOUR PRODUCTS



Many industries rely on HERESITE PURE PHENOL-FORMALDEHYDE resin lining in steel pipes and steel pipe fittings to control corrosion and commodity contamination.

Since 1942 the oil industry has used millions of feet of pipe which were lined with HERESITE to reduce corrosion fatique.

Catalog No. 60 will be mailed if requested on your letterhead.

HERESITE & CHEMICAL COMPANY

Main Office & Plant—Manitowoc, Wisconsin

General Coating, Inc.—Eastern Division—Woodbridge, New Jersey

Canada: Dominion Rubber Company, Ltd.
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Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland

Brass Mills Add Up Plusses

More research and availability of copper should combine to brighten industry prospects. Soaring sixties have been more sour than sweet because of slack sales, heavy imports

Nonferrous Metal Prices, Pages 130 & 131

EXPANDED research projects may go a long way toward building a better tomorrow for the nation's brass mill industry.

Dr. Clyde Williams, former president of the Battelle Memorial Institute and acting head of the newly formed Copper Products Development Association (a research group supported by the major copper producers), told the recent annual meeting of the Copper & Brass Research Association that new and expanded markets may be right around the corner. Now that the copper industry no longer has to worry about adequate supplies, says Dr. Williams, it can swing its main research efforts away from production problems to product development and marketing. "This will bring a renaissance in the red metal," he predicts.

• **Goals**—Here are the projects Dr. Williams' group plans to undertake or has under consideration:

• A stainless copper (possibly by metallurgical surface treatment).

• Organic and inorganic protective finishes for copper, brass, and bronze.

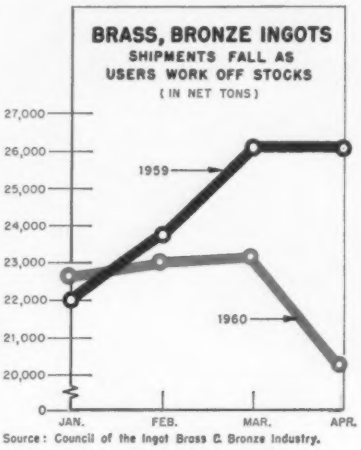
• Abrasion resistant plastic finishes for copper products and combinations of copper with the newer plastics and glasses to obtain materials with improved properties and esthetic appeal.

• Increased uses for copper in cast iron and as an alloy in steel.

• Copper base alloys with unusual properties and utility.

• Combinations of copper and aluminum for electric power uses.

• **Better Things Ahead**—The brass mill industry has several other plusses on its side that could spell better prospects. Foremost among them is the adequate status of copper reserves and mining and processing facilities. They virtually insure users against supply difficulties. The industry is developing better statistical reporting and evaluation to increase the effectiveness of market planning and sales forecasting. The bulk of substitution seems to have about run its course.



Source: Council of the Ingot Brass & Bronze Industry.

Those things should help reverse one of the industry's twin-pronged problems — lower per capita consumption of brass mill products over the last few years. The other problem: Steadily spiraling imports. They reached 1.9 million lb last year (or 10 per cent of domestic sales) and will increase unless the U. S. government takes some action, say brass people.

In the Markets

• **Tellurium Price Up**—Tellurium producers have upped their price 50 cents a pound to $3.50—the second such move in recent months. Demand has been unusually strong lately, thanks to increased production of butyl rubber (which uses tellurium as an accelerator), heavy buying from overseas (especially Japan), and stepped-up research in thermoelectrics. One reason for the bump: To discourage speculation. That is why the hike affected only quantity lots (100 lb and over). The price remains at $4.50 a pound for quantities under 100 lb. Look for the price to continue up as demand increases.

• **Diecasting Alloys Cut**—Producers of zinc diecasting alloys have cut prices by 0.25 cent a pound. The move was not surprising to metalmen since discounting had been going on for some time. Demand from diecasters has slumped in recent weeks with the resultant buildup in producers' stocks of special high grade zinc.

• **Lead Healthy**—The lead market continues to flex its muscles after several weeks of strong buying. A price upswing could be in the wind.

• **More Aluminum This Year**—April primary production hit 168,596 tons and boosted output for the first four months to 660,134 tons. Comparison: 611,219 tons in the like period of 1959.

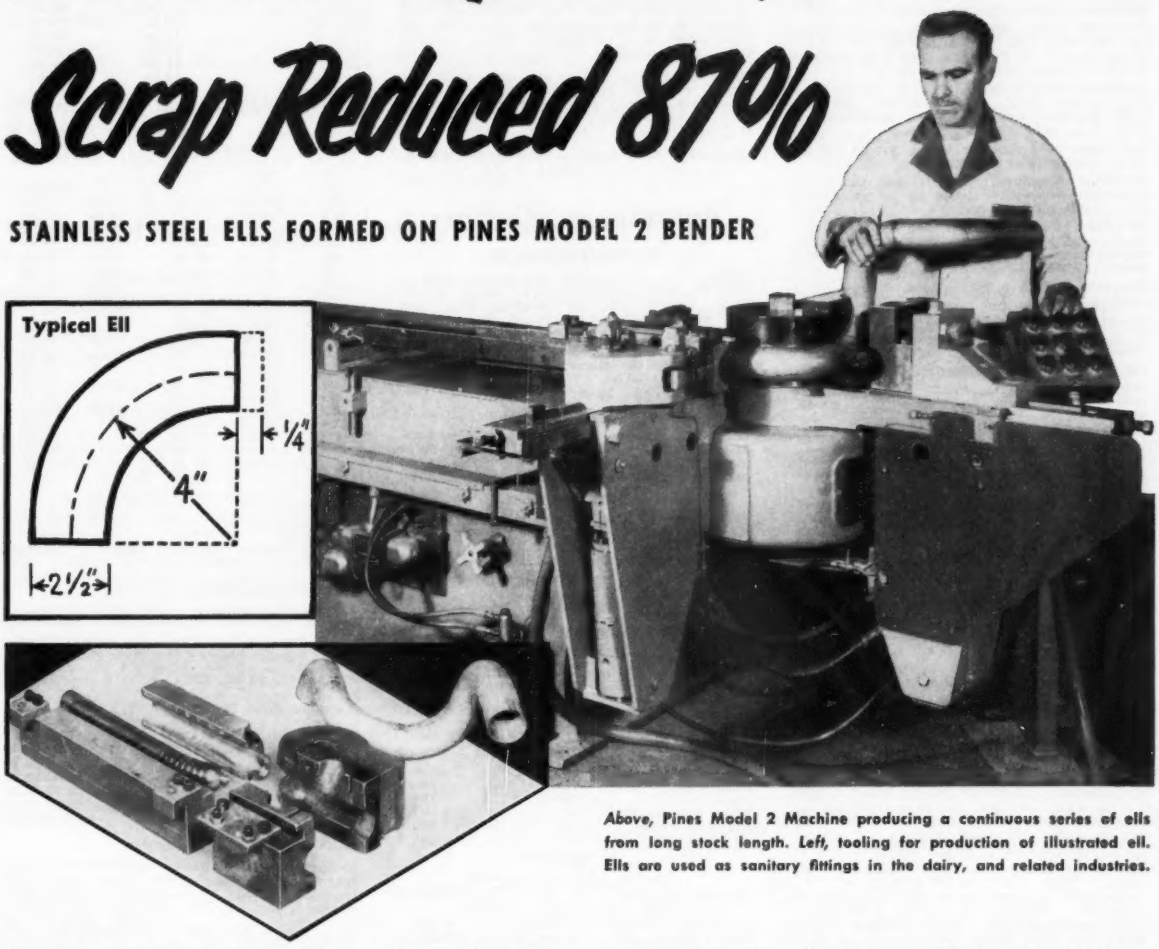
NONFERROUS PRICE RECORD

	May 25 Price	Last Change	Previous Price	Apr. Avg	Mar. Avg	May, 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00	Mar. 10, 1960	33.00-35.00	33.000	33.296	31.750
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	11.700
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	100.00	May 25, 1960	99.625	99.260	100.227	103.080
Zinc	13.00	Jan. 8, 1960	12.50	13.000	13.000	11.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Production Up 400%
Scrap Reduced 87%

STAINLESS STEEL ELLS FORMED ON PINES MODEL 2 BENDER



Above, Pines Model 2 Machine producing a continuous series of ells from long stock length. Left, tooling for production of illustrated ell. Ells are used as sanitary fittings in the dairy, and related industries.

Here's another illustration of how cold bending the "Pines-Way" can increase output and reduce operating expenses. This Pines Model 2 Machine has enabled Alloy Products Corp., Waukesha, Wisconsin, to produce four times more stainless steel ells and cut scrap losses up to 87% over their previous method. Prior to installation of this machine, short lengths of tubing were filled with lead and bent on a press. From 2″ to 3″ were trimmed from each bend, and production was 30 ells an hour. Today, these bends in Type 304 stainless are produced in sizes from 1½″ to 3″ O.D., walls of .050″ to .065″, at an average of 125 an hour. Scrap loss through material trimmed away has been reduced to ¼″ per finished piece.

Smooth, Small Radius Ells Produced in Continuous Series

Ells are produced as a continuous series of 90° bends in long stock lengths. All radii are less than 2x tube diameter. For example, 15 ells are bent in a 10 ft. length of 2½″ O.D. tubing on a 4″ centerline radius. Individual ells are saw cut from the spiral. Only ⅛″ of the costly stainless, the width of the saw blade, is lost from each end.

Compound Tooling is Major Factor In Scrap Reduction

Quality, scratch-free bends are produced on tooling that includes compound bending and clamp dies, a mandrel, and a wiper die. A cleat in the horizontal groove of the bending and clamp dies reduces the stock length clamped for the first bend. Succeeding bends are made by clamping on the preceding bend. Call on Pines bending experience and tooling skill for the answers to *your* bending needs.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

662 WALNUT • AURORA, ILLINOIS

WRITE FOR *FREE* CASE STUDIES

For further case study reports on the cost-cutting advantages of cold bending, write for free copies of "Pines News." Catalog also available.

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30, 50 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb f.o.b. Minneapolis; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 100.00.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.50; special high grade, 14.75 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-29.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.25-25.50; 13 alloy, 0.60 Cu max., 25.25-25.50; 195 alloy, 27.25-28.00; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft

Diam.	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.80
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 30.00c)		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.00b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	53.86	52.21	62.69	....	20.875	24.625	19.875
Munts Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.50-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 24.00-25.00; old sheets, 22.00-23.00; turnings, 19.00-20.00; rods, 24.00-25.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 4.00-4.50; new diecast scrap, 4.00-4.50; old diecast scrap, 2.00-2.25.

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 8.00-8.50; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.50-15.00; mixed high copper clips, 14.00-14.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; refinery brass (60% copper) dry copper content, 22.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; No. 1 composition borings, 19.75; No. 1 composition solids, 20.25; heavy yellow brass solids, 15.00; yellow brass turnings, 14.00; radiators, 16.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 1000 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 118.50; 200-499 lb, 117.00; 500-999 lb, 116.50; 1000 lb or more, 116.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.50; 100-600 lb, 69.20; 700-1900 lb, 66.40; 2000-9900 lb, 64.60; 10,000 lb or more, 63.30.

Stannous Chloride (Anhydrous): 25 lb, 153.80; 100 lb, 148.90; 400 lb, 146.50; 800-19,900 lb, 105.60; 20,000 lb or more, 99.50.

Stannous Sulphate: Less than 50 lb, 139.00; 50 lb, 109.00; 100-1900 lb, 107.00; 2000 lb or more, 105.00.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 125)

ent rate will hold until late June. A decline is expected in July and August when vacations and hot weather cut into consumption.

Blast furnace output is running ahead of consumption with the result that stockpiling of iron is increasing at many points. This indicates that additional shutdowns of furnaces will be announced soon.

A threatened shutdown of all blast furnace activity at the Bethlehem Steel mill at Lackawanna, N. Y., was avoided recently when striking employees of the South Buffalo Railway returned to their jobs under court order. The railroad serves the mill and is a subsidiary of Bethlehem Steel Co. The strike had threatened to shut down five blast furnaces.

Tubular Goods . . .

Tubular Goods Prices, Page 120

Downriver stocks of oil country goods have been rebuilt, and tubemakers have no place to ship their tubing, casing, and drill pipe, with drilling activity low, and users holding ample inventories. April and May bookings were equivalent to about 20 per cent of capacity at several big mills. One producer recently had a few releases of tonnage that had been on its books a long time.

Demand for 2 1/16 to 2⅞ in. tubing and 4½ in. casing is much better than it is for 7 to 13⅜ in. casing; unfortunately, the situation makes for unbalanced operations.

With two years of labor peace assured and surplus tubemaking capacity in the industry, consumers are departing from their traditional inventory policies. Major oil companies used to carry a six month supply in normal times and a nine month stock whenever a strike threatened. But with the 1959-60 labor crisis behind them, they're carrying liquidation further than expected—dipping well below six month levels.

Oil well drilling climbed during the week ended May 16. The Hughes Tool Co.'s survey showed 1812 rotary rigs in operation against 1787 the week before. Including the Canadian total of 121 rigs, the two-nation count was the highest in three months but far below the year ago total of 2240.

Better weather and a pickup in construction are reflected in a moderate improvement in demand for standard pipe. By May 20, one large producer had booked as much buttweld as it had entered in all of April. But miscellaneous seamless bookings were running slightly behind April's. Another company's May entries were about 50 per cent of capacity—40 per cent seamless, 60 per cent buttweld.

The big problem in standard pipe is imports. Large tonnages are being landed at coastal and Great Lakes ports. At metalworking centers bordering the lakes, importers have large stocks, and their quotations are about 20 per cent below U. S. mill prices. Wheeling Steel Corp. says imports forced the layoff of 2000 men at its Benwood, W. Va., and Steubenville, Ohio, plants.

Comparing May bookings with April's, one large tubemaker says buttweld pipe was up 100 per cent, line pipe up slightly, mechanical and pressure tubing down 20 per cent, and oil country goods off 50 per cent. Shipments of all products were 15 per cent lower in May than in April, but bookings showed a 40 per cent gain. At another company, May surpassed April by 10 per cent in shipments and bookings.

Rails, Cars . . .

Track Material Prices, Page 119

Orders for freight cars in April totaled 5551 units vs. 1995 in March, reports the American Railway Car Institute. Deliveries in April were 5579 cars, against 5950 in March.

Builders' backlogs as of May 1 showed 20,721 cars on order in railroad car shops and 20,282 in commercial shops, a total of 41,003.

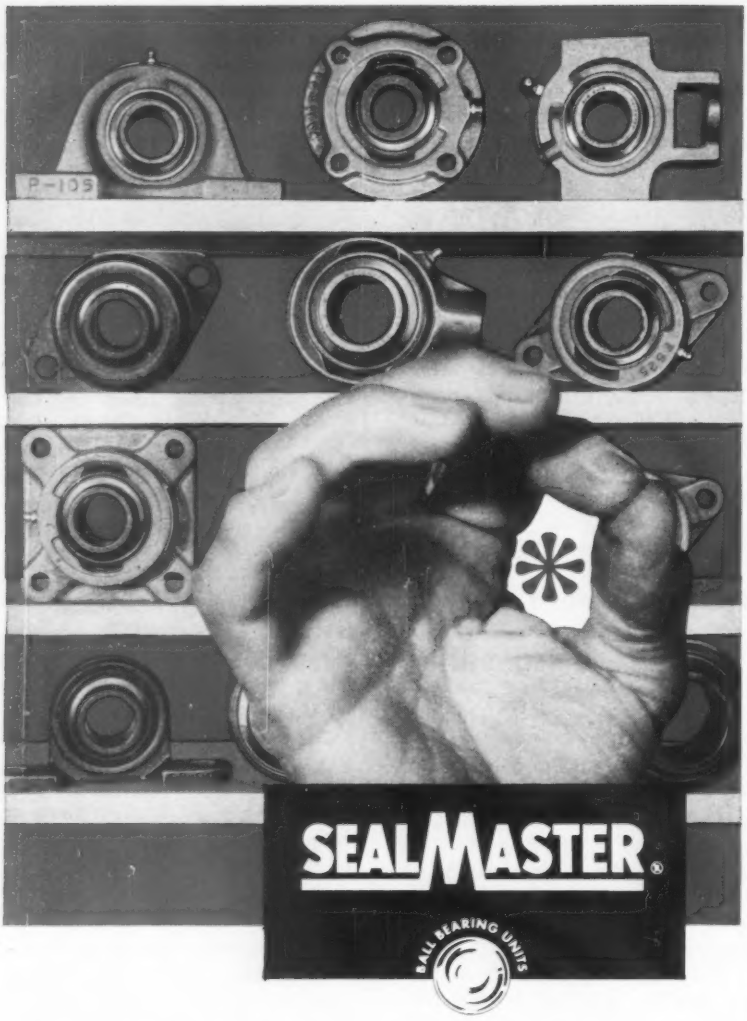
CLASSIFIED

Positions Wanted

MANAGER—Warehouse or sales, seven years in steel. Mill, warehouse and fabrication experience. College degree, age 35. Box 852, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $18.00, each additional word .36; all capitals, 50 words or less $21.00, each additional word .45; all capitals leaded, 50 words or less $25.00, each additional word .55. "Position Wanted" set solid, 25 words or less $5.00, each additional word .20; all capitals, 25 words or less $6.50, each additional word .26; all capitals leaded 25 words or less $8.00, each additional word .32. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.



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Backed by a quality reputation attained by SEALMASTER Bearings over the years and a complete line of quality bearing units in a wide range of sizes and styles of mountings, your Sealmaster Distributor is best equipped to give you top service on all your bearing requirements. The SEALMASTER line of cast iron units, malleable iron units, rubber lined units and cartridge units, incorporate engineering features exclusive with SEALMASTER.

Service is what you want and service is what your SEALMASTER Distributor is prepared to give—a good man to know and depend on.

Write for Catalog 454

SEALMASTER BEARINGS
A DIVISION OF STEPHENS-ADAMSON MFG. CO.
99 RIDGEWAY AVENUE • AURORA, ILLINOIS

PLANTS IN: LOS ANGELES, CALIF. • CLARKSDALE, MISS. • BELLEVILLE, ONTARIO

That compares with 31,131 on Apr. 1. On May 1, 1959, the figure was 35,479.

An order for 550 boxcars has been placed with the ACF Industries Inc. by the Chicago, Rock Island & Pacific Railroad. The cars will cost about $5 million; delivery of the order will begin in September. An unspecified number of the cars will be equipped with damagefree loading equipment.

Union Pacific Railroad will purchase 30 diesel-electric freight locomotives from the Electro-Motive Div., General Motors Corp., La Grange, Ill., at a cost of more than $6 million.

Balanced Metallics Goal Urged for Scrap Industry

A policy of "balanced metallics" to replace the standby status of scrap should be the goal of a reorganized scrap industry, Benjamin Schwartz, Benjamin Schwartz Co. Inc., New York, urged last week in addressing the Midwest conference of the National Federation of Independent Scrap Yard Dealers Inc. at Detroit.

The program would involve developing a balance between scrap, domestic ore, and imported ore. After defining his concept of "balanced metallics," Mr. Schwartz outlined a program to change the climate of relations with the steel industry and to change the image of the "mine above the earth" as a natural resource charged with the public interest.

Canadian Iron and Steel Production Passes Peak

Production of iron and steel in Canada has passed its peak for the first half, and a decline in the last half is anticipated.

April output of steel ingots amounted to 506,577 tons, 91.8 per cent of rated capacity. It compared with 585,922 tons (102.6 per cent) in March.

In the four months ending April, production of ingots totaled 2,199,-371 tons vs. 1,839,708 in the like 1959 period.

Pig iron production in April was 395,615 tons vs. 419,161 in March. Output in the first four months was 1,546,642 tons vs. 1,299,364 in the like period last year.

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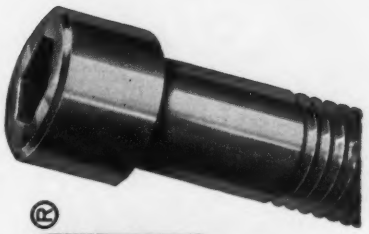

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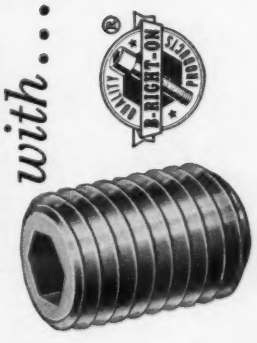
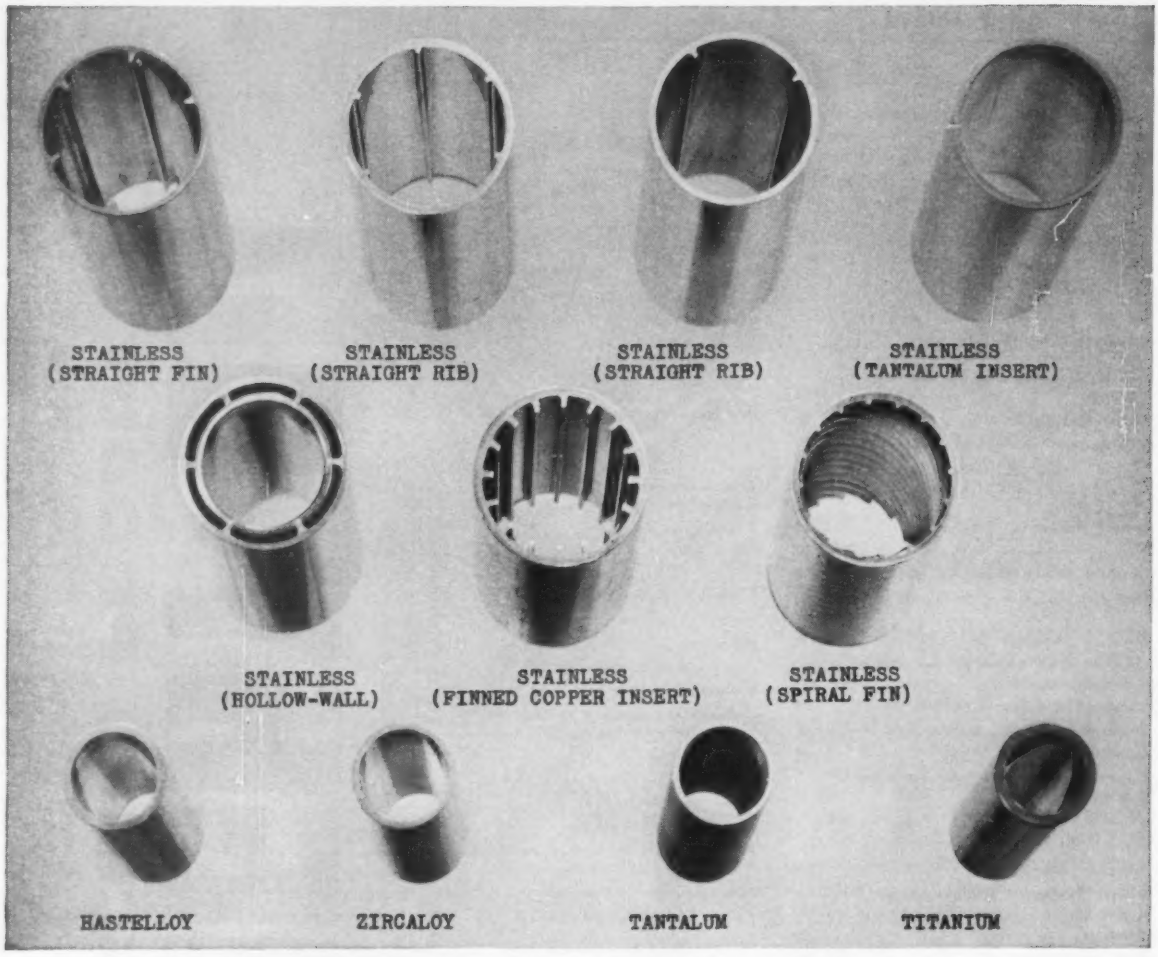
Cincinnati 2, Ohio

You can do better with . . .





ALL OF THESE TUBES WERE PRODUCED by a remarkable new process called FLO-ROL

Tubes like these have never been economically available before. The entirely new process, known as FLO-ROL, will produce a wide variety of internal configurations, in high cost alloys, stainless steel, and other hard-to-work metals, plus many bi-metal and tri-metal combinations. Wall tolerances for FLO-ROL tubing can be held to ±.0005" and diameters to ±.002" depending on sizes.

- *Internally Finned Tubes* offer increased surface for more rapid heat transfer.
- *Bi-Metal Tubes*—stainless steel tubes with tantalum, zirconium, or other expensive material offer exceptional corrosion-resistant qualities without the prohibitive cost.
- *Hollow Wall Tubes* or barrier tubes are available in several designs for nuclear work or other special applications where a chambered tube is essential or desirable.
- *Thin Wall Tubes* for pneumatic lines are available with .015" wall or lighter.

FLO-ROL precision tubular products can be furnished from ½" to 2½" O.D. and, in some instances, in lengths up to 75'. For complete information contact your nearest Damascus representative or write direct. For prompt service send prints and specifications—we will be happy to work with you.

Send for new FLO-ROL PRECISION TUBE BULLETIN TODAY

DAMASCUS TUBE COMPANY

STAINLESS STEEL TUBING AND PIPE

GREENVILLE, PENNSYLVANIA

Only TURBO-CUT by Threadwell has a full 3-4 thread plug chamfer!

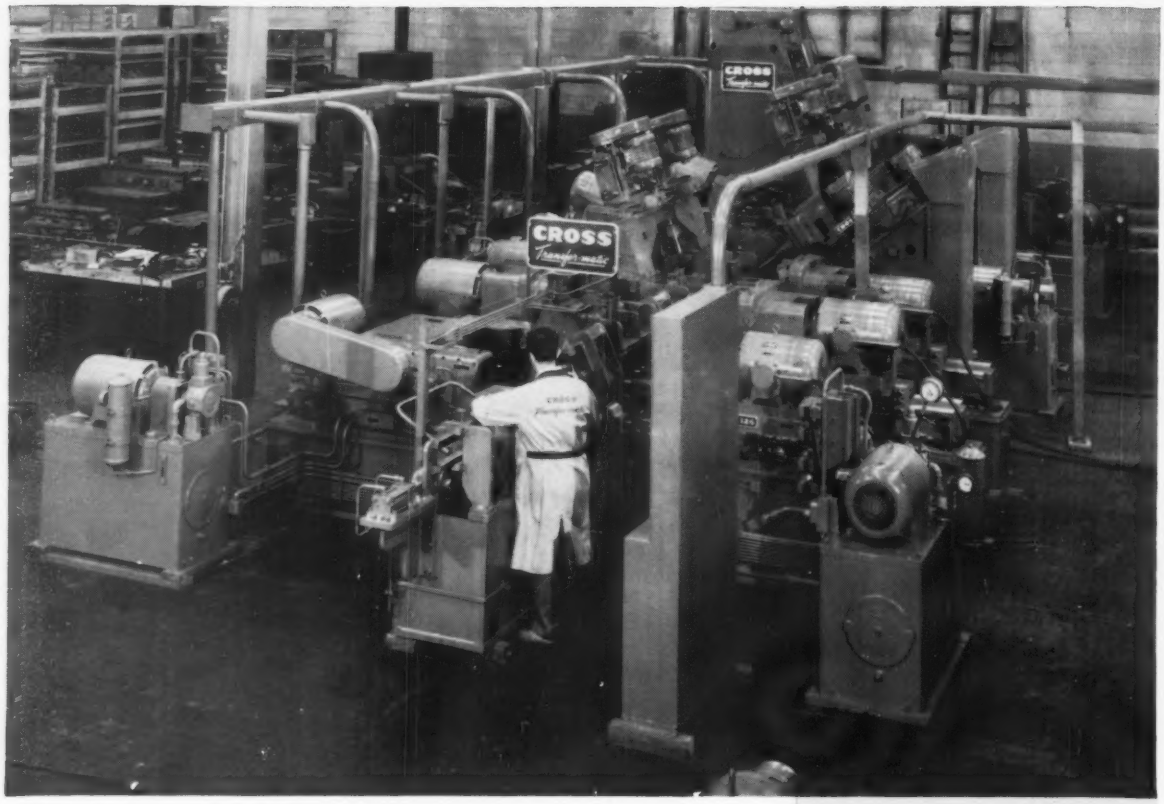
Benefit? Turbo-Cut's longer chamfer distributes the load over more teeth and breaks up chips to minimize tap breakage. Turbo-Cut's longer chamfer makes tapping easier and cleaner on through holes, does a one-pass job on blind holes. Only Threadwell makes the genuine Turbo-Cut with the longer chamfer.
Also available in bottoming chamfer.

Threadwell
MAKES THE BEST PRODUCT BETTER

INDUSTRIAL DISTRIBUTION
SERVING INDUSTRY ECONOMICALLY
THE RIGHT HAND OF PRODUCTION

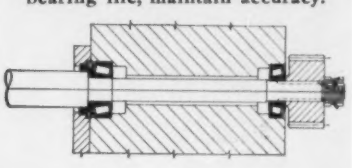
THREADWELL TAP & DIE CO.
GREENFIELD, MASSACHUSETTS

Stocking Warehouses: New York — Cleveland
Detroit — Los Angeles — Greenfield, Mass.



Why Cross chose Timken® bearings for all 148 drill spindles

How **THE CROSS CO.** mounts 148 drill spindles of its Transfermatic on Timken bearings to give longer bearing life, maintain accuracy.



THIS huge Cross transfer machine drills and taps holes in automobile engine blocks at new highs in speed and accuracy. To assure maximum user economy and machine life, Cross engineers chose Timken® tapered roller bearings for the machine's 148 drill spindles. Here's why:

1) *They maintain precision longer.* Timken bearings are geometrically designed to give true rolling motion, precision manufactured to live up to their design.

2) *They're extra tough* because Timken bearings are made of the finest bearing-quality alloy steel available.

When you use a machine with Timken bearings, you get all the *extra* benefits of Timken Company leadership in tapered roller bearing design and in engineering service. We maintain the industry's most modern laboratory to test bearing applications. To get better machines, make sure they're Timken bearing-equipped. ***When you buy Timken bearings you get...*** 1) *Quality you can take for granted.* 2) *Service you can't get anywhere else.* 3) *The best-known name in bearings.* 4) *The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, O. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.* Canadian Division: Canadian Timken, St. Thomas, Ontario.

Industry rolls on

TIMKEN®

tapered roller bearings